DOCUMENT RESUME

ED 184 576	IR 008 267
TITLE	A Comparative Evaluation of Alternative Systems for the Provision of Effective Access to Periodical Literature. A Report to the National Commission on Libraries and Information Science.
SPONS AGENCY	National Commission on Libraries and Information Science, Washington, D. C.
PUB DATE	Oct 79
NOTE	122p.
EDRS PRICE	MF01/PC05 Plus Postage.
DESCRIPTORS	*Cost Effectiveness; Feasibility Studies; *Information Centers; *Information Systems; National Programs; *Periodicals; Planning; Systems Analysis; Tables (Data)
IDENTIFIERS	Access to Information; *National Periodicals Center

ABSTRACT

This evaluative study hypothesizes and addresses three system approaches to a National Periodicals Center (NPC) that could be pursued at this time: (1) System A, a non-intervention approach which assumes events will be allowed to develop without introduction of federal legislation designed to subsidize or create a National Periodicals System (NPS) or an NPC; (2) System B, the creation of a centralized single-collection NPC as a main component of an NPS, subsidized with federal funds; and (3) System C, the creation of a subsidized utility that offers requesting libraries access tools for identifying the location of periodical articles and performs switching of requests for article copies to multiple market-oriented, fee-charging supplier sources. This system would be coupled with creation and operation of a dedicated NPC market-type collection for items not covered by market-oriented document suppliers. The study's overall view is that cost economies by themselves do not provide a rationale for adopting either system B or C, and that there are other criteria of greater importance which warrant further study. Chapters of the report discuss background, systems and issues, and criteria elements, and analyze financial costs and benefits, as well as qualitative issues. Tables and figures provide relevant data. (FM)

****
* Reproductions supplied by EDRS are the best that can be made *
* from the original document. *
****

ED184576

U S DEPARTMENT OF HEALTH.
EDUCATION & WELFARE
NATIONAL INSTITUTE OF
EDUCATION

THIS DOCUMENT HAS BEEN REPRODUCED EXACTLY AS RECEIVED FROM THE PERSON OR ORGANIZATION ORIGINATING IT. POINTS OF VIEW OR OPINIONS STATED DO NOT NECESSARILY REPRESENT OFFICIAL NATIONAL INSTITUTE OF EDUCATION POSITION OR POLICY

A COMPARATIVE EVALUATION OF ALTERNATIVE SYSTEMS FOR THE PROVISION OF EFFECTIVE ACCESS TO PERIODICAL LITERATURE

A REPORT
TO THE
NATIONAL COMMISSION ON LIBRARIES AND INFORMATION SCIENCE

BY

ARTHUR D. LITTLE, INC.
CAMBRIDGE, MASSACHUSETTS

NATIONAL COMMISSION ON LIBRARIES AND INFORMATION SCIENCE
1717 K Street, N.W., Suite 601
Washington, D.C. 20036

1979 October

FEB 13 1980

IR008267

TABLE OF CONTENTS

Page

LIST OF TABLES v

LIST OF FIGURES vi

EXECUTIVE SUMMARY 1

CHAPTER I: BACKGROUND I-1

- A. STUDY CHARTER I-1
- B. NEED FOR CLARIFICATION OF ALTERNATIVES' IMPACTS I-2
- C. NPC BACKGROUND I-3
- D. STUDY METHODOLOGY I-4
- E. ADDITIONAL IMPORTANT BACKGROUND I-5

CHAPTER II: SYSTEMS AND ISSUES II-1

- A. SELECTION RATIONALE II-1
- B. SYSTEM CHARACTERISTICS II-3
- C. SYSTEM DESCRIPTIONS -- ASSUMPTIONS FOR MODELING II-3

CHAPTER III: CRITERIA ELEMENTS III-1

CHAPTER IV: FINANCIAL COSTS AND BENEFITS ANALYSIS IV-1

- A. APPROACH IV-1
- B. GENERAL QUANTITATIVE BACKGROUND IV-3
- C. PARTICIPANT SECTOR COST AND REVENUE CHANGES IV-33
- D. COST AND REVENUE SUMMARIES IV-46
- E. SUMMARY OF FINDINGS IV-50

Page

CHAPTER V: ANALYSIS OF QUALITATIVE ISSUES V-1

A. SCENARIO ANALYSIS V-1

B. COMMON ELEMENTS FROM A FUTURES SCENARIO . . V-2

C. SUBSCENARIO FOR SYSTEM A V-8

D. SUBSCENARIO FOR SYSTEM B V-12

E. SUBSCENARIO FOR SYSTEM C V-15

F. SERVICE-ORIENTED ELEMENTS V-16

G. IMPACT-RELATED ELEMENTS V-19

LIST OF TABLES

Table No.		Page
III-1	GENERAL CRITERIA ELEMENTS	III-2
III-2	PARTICIPANT SECTOR INTERESTS AND CONCERNS	III-4
IV-1	PARTICIPANT SECTORS AND ACTIVITIES SUBJECT TO COST AND/OR REVENUE CHANGES	IV-4
IV-2	DEMAND CHARACTERISTICS OF 50,000 TITLE COLLECTION	IV-8
IV-3	CUMULATIVE PERCENT OF LIFETIME USE AS A FUNCTION OF PERIODICAL AGE	IV-10
IV-4	ILL COST DATA PER FILLED TRANSACTION	IV-14
IV-5	SYSTEM COSTS	IV-26
IV-6	SYSTEM C. START-UP AND TRANSITION COSTS	IV-32
IV-7	BREAK-EVEN PRICES TO RECOVER SYSTEM OPERATING COSTS	IV-41
IV-8A	UNIT PARTICIPANT COSTS AND REVENUES (4.8 Million Items/Year)	IV-47
IV-8B	UNIT PARTICIPANT COSTS AND REVENUES (2.0 Million Items/Year)	IV-48
IV-9A	TOTAL PARTICIPANT COSTS AND REVENUES (4.8 Million Items/Year)	IV-49
IV-9B	TOTAL PARTICIPANT COSTS AND REVENUES (2.0 Million Items/Year)	IV-49

LIST OF FIGURES

Figure No.		Page
II-1	PROFILES OF KEY SYSTEM FEATURES	II-4
II-2	SYSTEM SUBSIDIES	II-5
II-3	ANTICIPATED COLLECTION COMPOSITION AND USAGE . . .	II-6
II-4	PRIVATE SECTOR ROLE	II-7
II-5	LIBRARY COMMUNITY ROLE	II-8
II-6	SYSTEM ETHIC/ORIENTATION	II-9
IV-1	SEGMENTS OF TOTAL ACTIVITY COVERED BY SYSTEMS STUDIED	IV-6

EXECUTIVE SUMMARY

This is a report on a six-week project, intended to perform technical-economic analyses of three alternative means for providing access to the historical periodicals literature.

CONTEXT OF STUDY

The National Commission on Libraries and Information Science (NCLIS) has requested this study, because of critical questions raised by librarians, publishers and other private sector participants, related to plans for a National Periodicals Center (NPC) under consideration by NCLIS. The current NCLIS concern with regard to an NPC has been focused on drafting of possible federal legislation for an NPC, following several years of studies and consideration by various library-related groups and committees.

Past studies leading up to the LPC concept were concerned mainly with the economics and service levels associated with Interlibrary Loan (ILL), and ILL-associated costs and problems faced by libraries in striving to meet their service objectives. The ILL system in traditional operation was shown to have serious problems associated with high cost, inefficiency, low performance and unreliability. To address these problems, a National Periodicals System (NPS), containing a National Periodicals Center (NPC) as a main component, was proposed as a federally-sponsored entity.

Of the design studies and documents concerned with NPS and NPC, two are of particular importance: the Green Book, "Effective Access to the Periodical Literature," proposing a National Program for improved access to periodicals, prepared in 1977 by an NCLIS Task Force on a National Periodicals System; and the Burgundy Book, the "NPC Technical Development Plan" prepared in 1978 by the Council on Library Resources, Inc. The Burgundy Book takes the Green Book at its point of departure, and considers the design of an NPC, as part of an NPS, to consist of a document-locating and order-fulfillment service that libraries could draw on to order photocopies of articles from periodicals, as an alternative to ILL. The approach is based on photocopying articles from a single centralized collection of 50,000 or more titles, comprising current and back issues of the periodicals most likely to contain articles asked for, in original paper or microform representation. The NPC would serve as a "second tier" for service provision, filling a gap with ILL as the main load-bearing first tier; referral ILL to special resource collections would serve as the third access tier in the NPS, basically to provide access to more esoteric materials. The NPC would displace some 2.7 million to 4.8 million ILL requests, after 4 or 5 years of operations. Publisher participation would be voluntary, and full copyright payments would be made. The Burgundy Book describes the proposed NPC in detail. Its purpose was not, however, to consider alternative approaches.

Since the time of publication of the Burgundy Book, the concept of what an NPC should consist of has been hotly contested, among librarians, publishers and various information industry participants. Radically different viewpoints have been forwarded, representing very different value systems seemingly in opposition. Many articles have been written on the topic, and it has been debated in different forums.

As part of this process, the concept of what an NPC should consist of has itself continued to evolve and today what it should consist of appears to mean different things to different people. To some, it means a single collection as in the Burgundy Book; to others it means a set of cooperating collections, again subsidized and linked by an access network; to others yet it may mean a switching mechanism, an access network linking private sector document suppliers (as well as new comprehensive collections) to user libraries.

Creation of an NPC is perceived as possibly threatening principal interests of and relationships among major stakeholder groups, including research libraries, publishers of periodicals and private-sector suppliers of back article copies. Recognizing a need for mutual interaction among the major stakeholders as a requirement for working

8

through legislation that satisfies the needs of all parties, NCLIS has taken responsibility for creation of fora for stakeholder interaction. The current NPC committee, for example, has representation of the American Association of Publishers and the Information Industry Association, as well as of various library groups. NCLIS has also held open forum hearings on the topic.

Many questions have been raised in the course of these discussions, leading to NCLIS's desire to request the present study. These questions revolve around certain issue clusters:

- Whether the Burgundy Book and the studies leading up to it have considered a sufficiently broad range of alternative systems to achieve the objectives identified there,
- Whether the cost-effectiveness of the Burgundy Book (centralized collection) approach to an NPC has been sufficiently considered, compared to that of alternative systems,
- Whether new technology and private market developments have adequately been taken into account in planning for an NPC, and
- Whether possible long-term societal consequences and stakeholder realignments resulting from an NPC have been taken adequately into account.

PURPOSE OF OUR STUDY

The purpose of our study was to address the questions just listed, in as quantitative a framework as possible. To do this, we hypothesized and addressed three systems approaches to a National Periodicals System that could be pursued at this time.

The alternative means are:

- A non-intervention approach (System A), which assumes events will be allowed to develop without introduction of federal legislation designed to subsidize or otherwise create an NPS or NPC;

- Creation of a centralized single-collection NPC as a main component of an NPS, subsidized with federal funds (System B), along the general lines described in the Burgundy Book; and
- Creation of a subsidized utility that offers requesting libraries access tools for identifying the location of periodicals articles, and performs switching of requests for article copies to multiple market-oriented, fee-charging supplier sources. This would be coupled with creation and operation of a dedicated NPC-type back-up collection for items not covered by market-oriented document suppliers (System C).

As part of the NCLIS committee, task force and other NPC-related stakeholder-interaction activities, a legislative drafting team has been hard at work for many months attempting to formulate draft legislation that reflects the interests of all of the stakeholders, and this has culminated in a July 19th final draft, which appears to have at least passive support of all the stakeholder groups involved.

Our sense is that, for the majority but not all of the participants associated with the NCLIS NPC committee activities, the wording and intention of the July 19 draft more reflects an approach along the lines of what we describe as System C than that of the earlier System B approach. Not all the stakeholders are equally disposed, however, and the draft legislation recently introduced in the House of Representatives is seen by some as more favoring a System B approach.

Our work involved studying dozens of reports, scholarly papers and documents, conducting visits and interviews with individual and groups of stakeholders, meeting with the NCLIS NPS Task Force, with an Information Industry Association Group convened to respond to the NPC proposal and, mainly, an internal analysis effort. In general, we found the previous studies and analyses we reviewed to be responsibly executed within their frameworks of consideration, well done and arriving at reasonable conclusions. Much effort has gone into them that commands respect. Their frameworks of consideration have been extremely narrow, however, and the main intended thrust of this study is to consider the NPS issue in a broader context.

The approaches we considered span a broad selection of possible alternatives. We have concluded that they are the three most logical alternatives to consider at present. There are important limiting considerations associated with them, however, deriving both from the external situation and from the short time frame of our own study.

- First, the NPC approach we study in System B, the one outlined in the Burgundy Book, is no longer favored by many of its original supporters, who are now tending to an NPC based on a somewhat more decentralized set of smaller collections, along the line of our System C. The Burgundy Book, however, offers the only documented design approach to an NPC; also, our contract with NCLIS specifically requires consideration of it as an alternative.
- Second, no futures study has been made of what the situation would be like if there were no NPS intervention (as is our System A case). All studies of NPS or NPC have tended to look only at the present and past environments of ILL. They have largely ignored the future implications of existing ILL automation efforts, the activities of the bibliographic utilities, the activities of the private sector document suppliers, and the possible impacts of new technologies on electronic document delivery. We have had, then, to create a scenario for such a future environment drawing on our background relating to technological developments and the library field. This scenario is limited by the scope and brief timing of our project effort.
- Third, the approach of a subsidized switching network plus a dedicated back-up collection, System C, also has not been subject to a systematic design study or economic analysis. We have found it necessary, then, to analyze the performance of a hypothesized system which has not been designed in detail, and which could be created in a variety of different forms.

Our analysis is framed generally in terms of three sets of criteria:

- Service-related criteria, ones having to do with the reliability and timeliness of response, completeness of coverage, preservation of materials, adequacy of finding tools, quality of access and other matters of importance to the library constituency served;
- Cost and cost/benefit-related criteria, ones subject to quantitative modeling and analysis; and
- Criteria having to do with social considerations and longer-term consequences.

The thrust of our study, given the pre-existing situation and the limited timing and scope of effort available, has been to highlight the issues of most importance, provide a quantitative framework for viewing costs and benefits, and provide what guidance we can as to what can or should be done next.

We discuss the background and context of our study in additional detail in Chapter I, and we expand on the definitions of the Systems A, B, and C in Chapter II. In Chapter III we briefly cover the criteria elements used in our analysis effort. Chapter IV covers our quantitative modeling effort, and Chapter V our qualitative considerations. Both Chapters IV and V contain findings. We summarize and comment on only the most important of these findings in the remainder of this Executive Summary.

OVERALL FINDINGS

In summary, the time for a System B, a centralized NPC, has come -- and it also appears to have gone. On the one hand, the original economic and level-of-service arguments showing the superiority of such a centralized NPC over ILL as it has been in the past are either becoming irrelevant or will have much less force in the future. The availability of periodical articles will be far improved over that historically experienced due to events separate from an NPC, and already well underway. On the other hand, a centralized NPC based on hard-copy paper or microforms will be prone to technological obsolescence shortly after it reaches full-scale operation in five to eight years.

1. Despite high professional integrity, the collection of past studies leading to recommendations for an NPC have been conducted within a very narrow context. The studies mainly are oriented to the economics and operations of ILL and library operations in the past -- rear-view analyses that do not apply to the world of 1985 and beyond. And 1985 is about the first date for a full-functioning NPC, given the (probably favorable) time scale anticipated in the Burgundy Book.
2. The proponents of an NPC were correct; in the context of comparing ILL costs with NPC costs in the past or even the present, a centralized (System B) NPC appears to be a superb social investment. The introduction of on-line ILL technology promises to reduce the costs of this approach significantly, however, as well as improve its performance; this will largely undercut the economic benefits of System B (and of System C, to some extent) as compared with those of the non-intervention System A.
3. The future will offer significantly improved capabilities for access to the periodicals literature, due to events already underway, regardless of whether action is taken with regard to a federally-sponsored NPS or not. Improvements are to be expected in the geographical scope of ILL efforts, the reliability, responsiveness and timeliness of ILL activities, the distribution of ILL load among libraries, and the comprehensiveness of bibliographic and finding tools relating to periodicals. Improvements will be due to on-line ILL systems being provided by the bibliographic utilities like OCLC, better bibliographic access tools like CONSER,

and initiatives of publishers and private sector document suppliers.

4. We are sympathetic with the intention of those supporting the NPC concepts, to assist libraries moving into the present and future by relieving them of some of the burden of exhaustive collection development, to lower the costs and improve the effectiveness of ILL, and thus to serve patrons better. All three systems will tend to have this impact, however, and our sense is that the differential impact of System B (the centralized NPC approach) will be significantly less in the future than it would have been in the past.
5. Whether System B produces net economic benefits or losses in terms of total direct costs is critically dependent on the volume it handles. At high volumes (5 million transactions per year), there is up to a $3 benefit to use of an NPC (System B) as compared to ILL (System A). At low volumes (under 2 million per year) NPC saves little more than $1 per transaction. These savings do not take the costs of the subsidy of NPC into account, however.
6. If subsidy costs also are included when considering either a System B or System C NPC, then the NPC probably can be expected to cost more per transaction than the free-market System A approach except at high volumes.
7. System C occupies a middle position between A and B for costs at high volumes, and is even more sensitive than System B to increase in per-transaction cost with decrease in volume of transactions.
8. The volume of transactions that would pass through a System B - type NPC is vulnerable to two factors that are ill-understood at present: the degree to which publishers would indeed elect to place materials in NPC with a reasonable copyright fee, and the degree to which libraries would elect to use an NPC,

14

given a high quality automated ILL system in competition with it. These remarks also are applicable to System C.

9. While copyright payment appears to be a critical issue for stakeholders concerned with an NPS, total revenues accruable to publishers from the volumes anticipated for any version of a NPC are modest compared to their main revenues from subscriptions.
10. Since most ILL transactions do not result in copyright payments and, by agreement, all NPC transactions will result in copyright payments, a centralized system B NPC would save money for libraries only if the savings due to increased economy of scale of operations (as compared with ILL) exceed the average copyright payment (now about $2 per item, according to the Copyright Clearance Center).
11. The subsidy anticipated to be required for System B is of the order of $26 million (and about $34 million if interest were charged). The value of this investment could deteriorate significantly in the later 1980's with the development of alternative electronic information storage and transmission means for periodicals articles.
12. It will be at best very expensive and probably not economically feasible to convert a paper or microform-based NPC collection (Systems B or C) into the formats that will be used for electronic information delivery in the future. The one electronic information delivery option available to NPC, facsimile, will probably remain expensive, labor-intensive and not in major use. Thus, technology is apt to by-pass and obsolete any NPS collection that might be built up at this point.

It can be tempting to think of first building a microform or paper-based collection (System B), and then planning to convert, as early as possible, to electronic distribution of new materials when publishers convert to electronic distribution means. This expectation may not be realistic, however, since the publishers will own and control the electronic data bases, as they do now in many instances, and they could not want to license use of these to NPC since their own survival in the future may rest on tight control of those data base resources.

Only a continuing process of exploration of mutual interests between publishers and library representatives can ensure long-term viability of an NPC of either type in an increasingly electronic information delivery environment. This points to an important possible long-term role for NCLIS, as well as to the necessity for embodiment of a balanced group of stakeholder representatives in the governance structure of an NPC.

13. It is unclear to us at present whether System C is on the whole superior or inferior to System A, or whether some variant of System C might be superior. One might consider a subsidized utility without dedicated collections, for example. Choice among these requires greater clarity of analysis of both economic and policy issues associated with:
    - the likely information transfer environment of 1985-2000, and how user needs for materials now appearing in periodicals' articles are likely to be met, given the changes that must be expected not only in technology but also in business, leisure and the professions; and
    - the optimal design of a System C, intended to match the needs of that environment.

We suggest that these matters be studied thoroughly prior to any decision on a subsidized periodicals system.

Our overall view is that COST ECONOMIES BY THEMSELVES DO NOT PROVIDE A RATIONALE FOR ADOPTING EITHER SYSTEM B OR C, AND THAT THERE ARE OTHER CRITERIA OF GREATER IMPORTANCE.

- There is a real question as to whether NPC volumes, for either Systems B or C, would be sufficient to produce overall cost savings for libraries. The $26 million subsidy might be employed better by libraries for other purposes, including continuing to develop finding tools which will undergird any electronic location and delivery system for periodicals in the future.
- The total impact of Systems B or C, in terms of requests by users for single copies of periodicals articles, is not anticipated to be very great. Only 5 million of some 20 million ILL requests are anticipated to be displaced at most (in 1985), and there are another some 20 million or more single copies estimated to be obtained through reprints, photocopying within a library, and photocopying from private subscriptions. Thus, the whole domain of consideration of Systems B or C is only a modest portion of the whole demand.
- There are several unresolved critical issues, some involving the public-private interface, some involving copyright, some involving jeopardization of intellectual freedom, that far overshadow the monetary ones. Direct federal involvement in information is a matter of over $20 billion; publisher revenues are comparable. The few million per year saved by libraries (or perhaps spent unnecessarily by the government) are very small sums indeed compared to the critical issues involved.
- $26 million would not be too great an investment to help obtain for libraries a firmer place in the mainstream -- one they sought in part here through acquiring freedom to avoid the need to collect locally little-used periodicals. We are in a society in which information is one of our principal

national resources. The library community's concern with the NPC derives from a sense of urgency about doing something to increase libraries' service orientation. The value of this thrust from within should not be lightly dismissed. Nor should the library profession allow the energy mobilized behind this initiative to be dispersed without identifying key steps to be taken now to realize its objectives collaboratively in the broader information community in the late eighties.

CHAPTER I

BACKGROUND

A. STUDY CHARTER

Arthur B. Little's charter in undertaking this study was to perform a factually-based technical-economic analysis of at least three alternative means of supplementing the on-site periodicals access capabilities of libraries through providing a dependable form of external back-up access to the periodical literature. It was to be a comparative study, using as the point of reference the plan outlined in NCLIS' "Effective Access to the Periodical Literature" (the Green Book) and defined more specifically in the Council on Library Resources "NPC Technical Development Plan" (the Burgundy Book). This and two alternatives were to be examined in terms of several important parameters. These included: the alternative systems' costs and revenues, their performance, private market sector involvement in the delivery mechanisms created by the systems, the general systems' configurations, the systems' use of and viability in the face of new technology, the systems' general implementation phasing, and the relationship of each system to the other components of a National Periodicals System.

The study was to be as quantitative as possible, given its less than six weeks duration, with no expectation that new data would be gathered, but the hope that data from existing sources would be provided to Arthur D. Little by NCLIS and other stakeholders. Our emphasis was to be primarily technical and economic, stressing the factors listed above, rather than socio-political, although matters relating to the legality or acceptability of an attractive system were recognized as relevant.

The result of our analyses was to be a report in which we:

- identified our assumptions and sources of factual data underlying the analysis;
- described the analytical approaches employed;

- defined costs and benefits, advantages and disadvantages of following each approach;
- examined barriers to evolution of each projected approach toward its desired end state;
- cited missing data and named absent data critical for eventual decision-making; and
- identified major issues or problems that could not be addressed adequately in the analysis.

B. NEED FOR CLARIFICATION OF ALTERNATIVES' IMPACTS

At the time the contract with us was written, NCLIS hoped to be able to identify for us major questions which the Congress might ask as to needs, benefits, and requirements for a National Periodicals System. This was to help us direct our work so as to incorporate definition and exploration of these major questions. Although NCLIS did not supply us with such a list of questions, a meeting with the NCLIS Research Committee did set the context for the study and highlight needs of the communities involved in this controversy.

The Research Committee made clear a general perception that the issue before the Commission and the library community was no longer whether a National Periodicals System or Center should exist, or what it should do, but rather how the function should be performed and how it should be organized. The Research Committee emphasized the need for all parties to the decision to know more fully how the interests of the several different communities involved really interact, as well as where changes in costs of service, directions of savings and impacts of flows would impact under any new system. Our sense from this meeting was that many of the last year's developments related to the NPC could be explained in part by the difficulties being experienced by nearly all involved to grasp the issues in a basic enough way to see beyond their individual stakeholder positions. This observation was reinforced by perceptions communicated to us in interviews.

C. NPC BACKGROUND

As of August of 1979, the current Arthur D. Little study is the latest of many studies conducted over the past six years on the need for better access to the full text of periodical materials. The theme of a National Periodical Center first emerged in these studies as typifying the kind of solution which was perceived by librarians as needed for improved periodical access. In subsequent work, proposals for NPC development became increasingly specific, and culminated in the Burgundy Book which set forth many of the design features for an actual center.

In the period since the publication of the Burgundy Book, the subject of an NPC has received attention and discussion from within the research library and broader library communities as well as from publishers, information brokers, firms performing document delivery, and other information providers. The debate which has occurred during this period makes clear that there is general agreement about the need to improve access to periodicals, but that there has been and, to a lesser extent, continues to be significant dispute about the means for doing so.

The debate has shown that the stakes are high because the parties at interest perceive their future well-being resting significantly on the outcome of this decision. As our discussion will indicate, leaders in the library community are interested in the NPC as a means to make possible an unlinking from the collecting ethic that often has led them to make acquisitions as much for posterity as for current users. The qualitative assessment of the issues in Chapter V also will show that librarians and document delivery firms both feel that they face potential disintermediation from their users unless the NPC argument is resolved in their favor. The July 19th NCLIS legislative draft appeared to offer a compromise approach acceptable to all. Yet, a high degree of ambivalency remains with some stakeholder groups, leading to discomfort with any less than completely spelled out approach.

D. STUDY METHODOLOGY

Pursuant to our task of providing a technical-economic analysis of three alternatives, we concentrated in large part on obtaining and analyzing previously existing data on the institutional framework for document delivery. Since we were concerned with the processes involved in the present form, or some future form, for transfers of periodical materials from one site to another, we extensively reviewed the Green and Burgundy Books, existing studies on interlibrary loan and library costs, the sizes of private sector document delivery firms' inventories and collection management practices, background information on structures conceived and implemented in the last few years with functions somewhat similar to those of an NPS, and the operation and implications of new technology on interlibrary loan.

We conducted a limited number of interviews of individuals who had contributed to the existing sources of data or operated activities which were generating relevant data at the present time. We are very sensitive to the fact that there are many other individuals whose involvement in conceiving the NPC or helping to flesh out the concept would have enabled them to contribute meaningfully to this study. We were unable in the short time available to spend the time to meet with more of these people and regret that we could not do so.

Our findings follow in four chapters:

- In Chapter II, we introduce each system, describe in general the environment we visualize as applying to it, and then distinguish and characterize at greater length sets of assumptions about each alternative.
- Chapter III provides a brief description of the criteria elements we developed to perform our comparison analyses.
- In Chapter IV, we assume a more completely defined set of system characteristics for purposes of quantitative analyses.
- For the qualitative assessment in Chapter V of features which could not be modeled, we then relaxed the assumptions, described systems operations in scenarios, and discussed a wide range of possible system features and comparative performances.

E. ADDITIONAL IMPORTANT BACKGROUND

The background described above covers events leading to the commissioning of Arthur D. Little to perform the study. Yet, given the importance to any final settlement of this issue of the mind set and thrust of the communities with interests at stake, it also is necessary to describe the pragmatic and emotional considerations of the library leaders who are vitally concerned with the results of our work. The cause which the library community has supported with near unanimity was that of unlinking itself from what had become a costly and dangerous over-adherence to the collecting ethic. In a world in which many economic and social forces have effectively conspired to begin disintermediating the library from the public, the conception of the NPC was a brilliant deus ex machina. It was a significant step forward for the library profession and an indication of previously unprecedented flexibility in conceiving ways of executing its service responsibilities.

Of equal urgency to organizations on the other side of the NPC argument, firms and library organizations already in the business of creating documents or providing document delivery found themselves actually or potentially facing their own disintermediation. An NPC which succeeded in performing most of the roles imagined for it in the Green and Burgundy Books would have succeeded in inserting itself between a portion of the country's publishers and readers. Recognizing the gap, both librarians and private sector firms were increasingly gravitating to a System C-type approach. This was the context which Arthur D. Little faced beginning the study. Retaining the status quo could be said to be in no one's best interests. Findings urging anything less than immediate submission of draft legislation for an NPC would be perceived as a loss to much of the library community, since it has experienced widespread, albeit qualified, support for the concept from the profession. Yet, as noted above, the nature of our study charter required us to consider alternatives postulated on broader sets of interests, and placed the desired outcome (proceeding with an NPC) open to doubt.

From the outset of the study, we have been aware that among the findings least welcome to the community would be recommendations for a moratorium or for any further study. Yet, in the context we have described, our objectives for conducting our work could only be that (1) we pull no punches; (2) we depict as clearly as possible the differences among the issues from the perspectives of the different sides -- and the interdependence of the players; and finally, (3) since the last few years' NPC disputes represent a growth towards understanding among stakeholders, we believe it vital to the survival of all parties, that we recognize this important growth and seek further to extend the mutual understanding.

The different interest groups involved in this matter have engaged in qualified but critical collaboration in the last several months. NCLIS, the NPC Committee and the Research Committee have acted responsibly -- at a time when responsible policy on the information-related aspects of the public-private interface has been slow to emerge -- by recommending that the question of alternatives to the proposed NPC structure receive real consideration.

The Arthur D. Little study findings on the different alternatives' costs, flows, and sector interactions represent a basis from which to make informed judgments about what is in stakeholders' mutual interests. The Commission's request for -- and we assume the effort to understand and apply -- a technical-economic analysis of the country's needs for access to periodical literature shows a desire to base future action on knowledge of consequences. In the past, the separate stakeholders sometimes have failed to consider, or demonstrate a sense of responsibility for, future results of actions they desire in their self interest. This time, the library group has been willing to consider an innovation that would impact on fundamental habits of libraries and effect the kind of order of magnitude improvement in viability that libraries need. The understanding that led the community this far testifies to the fact that what is critical, and indeed has already occurred, is a change of attitude. NCLIS has been serving a role of building understanding in the public's interest. It is our intention to support NCLIS in this regard. It is in this light that we have conducted our study.

CHAPTER II

SYSTEMS AND ISSUES

A. SELECTION RATIONALE

To perform the quantitative economic and technical analysis required for our study, we agreed to compare three alternative systems for delivery of back and possibly current periodical articles to libraries. The contract stipulated, as one of these alternatives, a centralized NPC (System B) as it has been described by and to the library profession in References 1 and 2. In our formulation of the other two systems, we were moved by several considerations -- among them the aims:

- To reflect the spirit of alternative approaches that have been suggested during the last several months' discussions among those concerned;
- To select alternatives with significant differences to allow us to consider key variations possible on each structure;
- To dramatize differences in perspective among the publishing, library and document delivery communities, which we found to be great; and
- To help us illustrate how the different approaches reflected patterns of different stakeholder views which at the same time are deeply held by the majority of each group and are internally consistent.

These aims led us to develop as our first alternative, System A, a projection of today's world some six years into the future, in 1985. This alternative is simply the situation as we project it will be if no legislative intervention takes place -- the system as it will likely develop if events go on as they are going on now. This alternative explores the use of existing capabilities in the private for-profit, private not-for-profit, and library sectors. It visualizes, and to some extent tests the sensitivity of, the way this pluralistic mechanism will work in the face of long-term changes in practices and technologies used by all three sectors. For the purpose of quantitative cost analysis, we focus within this environment on the segment that is most similar to (or most competitive with) an NPC, namely the segment that might be termed advanced automated ILL.

Alternative System B is a single, largely centralized, dedicated NPC, modeled generally on References 1 and 2. A conspicuous feature of NPC deliberations over the last few years has been the evolution of the conceptual structure which the majority of the library profession is seemingly willing to accept -- from a physical collection housed in a single site to a collection of resources dedicated to NPS use but not necessarily all sharing one location. The specificity required for our costing purposes made it necessary to restrict the system architecture represented by the proposed center, and we elected to use the single centralized physical collection described in Reference 2. However, we do not believe this biases the analysis.

The third alternative, System C, is a somewhat regulated decentralized or distributed system, combining subsidized referral and finding mechanisms, dedicated collections and primary reliance on market-oriented suppliers. It is the least well-developed of the alternatives because it reflects neither an extrapolation of current trends nor the result of several years planning efforts. This alternative reflects a desire to satisfy all the objectives of an NPC, but uses a distributed system able to take advantage of existing resources. This system design also frankly attempts to find an approach which satisfies the policy objectives of avoiding putting elements of the private sector out of business or jeopardizing private investments in improved document delivery. Our sense is that the majority of those involved in the NCLIS legislative drafting activity for an NPC are tending towards a System C-type approach, although there is much latitude for alternative design options in the draft legislation.

B. SYSTEM CHARACTERISTICS

We describe these systems in several ways in the report:

- by important descriptive dimensions in this chapter;
- as assumption sets in the quantitative analysis of alternative systems in Chapter IV; and
- in scenarios introducing the qualitative assessment of alternatives in Chapter V.

By way of introduction, at this point we portray the three systems first according to a set of descriptive dimensions. In addition to basic characteristics, which are presented in Figure II-1, these dimensions for distinguishing the alternatives include System Subsidies (Figure II-2), Anticipated Collection Composition and Usage (Figure II-3), Private Sector Role (Figure II-4), Library Community Role (Figure II-5), and System Ethic/Orientation (Figure II-6). In these figures we view the systems in broad terms, rather than the more restricted versions used in the modeling exercise, Chapter IV.

C. SYSTEM DESCRIPTIONS -- ASSUMPTIONS FOR MODELING

This section describes the features we determined were necessary for purposes of costing and distinguishing policy options to characterize the three systems options. As we noted above, only for System B did anything like a system design exist at the start of our work, and it has not been possible, given the time and scope of our effort, to create designs for alternative Systems A and C. Further details of each system are described in Chapter IV, where we also provide some of the rationales behind the decisions we have made in selecting the specific forms for each of the systems.

Each of the system concepts we have investigated could be implemented in a wide variety of forms with minor variations in service offerings, participants, cost recovery mechanisms and the like. For purposes of quantitative analysis, however, it was necessary to settle on specific characteristics for each system and this is done in the discussion below and in Chapter IV. In presenting our findings, however, some consideration of the many possible variants are incorporated.

FIGURE II-1: PROFILES OF KEY SYSTEM FEATURES

SYSTEM A	• This "system is the configuration of private for-profit, private not-for-profit, and public libraries, publishers and document delivery organizations which will continue to develop if NPC legislation is not passed. Its components will include: - the present interlibrary loan system as significantly impacted by OCLC and the other bibliographic utilities; - document delivery organizations, information brokers, and the like--their activities likely to be accelerated absent the threat of establishment of an NPC.
SYSTEM B	• The NPC is a library's library for maintenance of periodicals and servicing of requests for articles and issues. It - strives for a single "comprehensive" collection; - operates as a "second tier" back-up to the ILL system; - pays copyright fees with publisher involvement voluntary; - uses hard copy and the (non-electronic) mail system in its initial operations; - is subsidized during its initial operations; - may act as a publisher's sales agent for current materials.
SYSTEM C	• The distributed NPC is a subsidized electronic information utility linking libraries with: - private sector document suppliers; - specialized existing library collections (e.g. C.R.L.); - new subsidized collections of materials, as needed to maintain availability; - a comprehensive centralized or distributed back-up collection. • The distributed NPC: - provides a somewhat regulated, electronic information marketplace; - resembles the 1976 conceptual paper by J. Wood, which the I.I.A. studied; - stipulates rules and agreements for participation to assure continuing preservation of materials and comprehensiveness of the total national periodical resource; - offers specialized order-fulfillment software and funding tools.

FIGURE II-2: SYSTEM SUBSIDIES

SYSTEM A	• *"Borrowers" continue to be subsidized by "lenders" in ILL, although the trend decreases due to load-leveling mechanisms and increasing institution of lending fees. • Copyright payments are minimized since CONTU guidelines apply to most operations.
SYSTEM B	• As * above, but to a lesser extent due to compensation to the NPC and its referral libraries by borrowing libraries. • Subsidy is used to create a single, new source of supply of periodicals; collection and delivery are both subsidized to the extent they are not covered by user fees. • Today's hierarchical ILL arrangements will be altered; – existing ILL subsidies to libraries by their parent organizations may be used for NPC payments; – these subsidies may flow in small part to the private sector suppliers of the top 2000 to 5000 most frequently used periodicals. (Private sector suppliers may offer these at a lower price than the NPC.)
SYSTEM C	• As * above, but to a lesser degree. • Subsidies in System C are used partly for creation of a communications network and user software. The network connects suppliers and libraries and thereby leads to the creation of an "electronic marketplace" for periodical articles. • The system also will subsidize one or more NPC dedicated collections necessary to supplement those the private sector is unable or unwilling to make available.

FIGURE II-3: ANTICIPATED COLLECTION COMPOSITION AND USAGE

SYSTEM A	• There is no new subsidized collection, although build-up of collections of private sector document delivery organizations is likely. • Unless some libraries specialize (probably for a fee) in making available materials for which there is little to no demand, some items could disappear from all collections. As a result, the trend toward substitution of available for unavailable requested material--now practiced because of ILL's inadequacies but in the future because the requested item may no longer be available--may become more prevalent.
SYSTEM B	• System B relies almost exclusively on its own dedicated collection with 50,000 retrospective and current titles acquired within the first five years. The collection's other features: - it is centralized and subsidized; - it draws on NLM and other research collections for back-up (on the basis of prior agreements). • The objective for this collection is comprehensiveness although it is not necessarily achievable, since many publishers may have other agreements or simply may not want to cooperate.
SYSTEM C	• Private market suppliers will fill most demand for most high volume materials, as well as for areas like doctoral dissertations where specialized private collections already exist. - Choice of a supplier depends on what each competitor offers; a finding tool lists all options. - A subsidized dedicated NPC collection as well as a network of back-up arrangements covers the periodicals which the private sector does not wish to provide. - Every two years the private sector can acquire the right to offer materials supplied by the NPC, so long as the offeror is willing to contract to provide specified services. • Contractors must have the resources and willingness to agree to NPC terms; they are not required to be for-profit private sector firms, but also can include not-for-profit organizations. All NPC requests must pay copyright fees; however, there is no bleedover to ILL.

FIGURE II-4: PRIVATE SECTOR ROLE

SYSTEM A	● Role is as it is now--private sector document deliverers will be used primarily by special libraries and individuals or, on rare occasions, by academic libraries. ● Publishers are impacted negatively by "fair use" and unreported ILL photocopying. ● Private sector document delivery services are likely to expand. - While they are foreseen to expand, we do not anticipate a major increase of their share of the market in the time span of interest, given most libraries' preference for ILL over private sector transactions.
SYSTEM B	● Publishers receive copyright fees. - *Their participation is voluntary. - *They may not cooperate fully. ● Private document delivery firms, which must compete with the NPC will become more vulnerable to being forced out of business.
SYSTEM C	● As * above. Despite the fact of subsidized NPC competition, the system design represents an attempt to maintain a competitive environment among existing document suppliers. ● Private document delivery firms likely to see expansion of their market. They may, however, experience what they consider to be unfair competition from not-for-profit suppliers participating in the same NPC utility.

FIGURE II-5: LIBRARY COMMUNITY ROLE

SYSTEM A	• Libraries are susceptible to copyright litigation in jurisdiction(s) chosen by publishers to help set the legal precedents they desire associated with ILL photocopying. • On-line transaction processing made possible by automated ILL systems helps move the profession toward the "automated library office." • Accommodations to existing ILL arrangements are needed: – *Borrowing and lending hierarchies experience the need to adjust to the new system potential to disperse requests to a broader and less closely-related set of lenders. – *Today's institutional arrangements for "payment" for ILL, for the most part receipts not easily transferred among accounts, are moderated to allow for more direct payments of funds. – ILL moves to being a national or regional rather than a strictly local phenomenon.
SYSTEM B	• As for * above.
SYSTEM C	• As for * above. • The capabilities of the electronic marketplace aspect of the system may push libraries toward earlier acceptance of: – the need to reconcile relationships in terms of more truly national linkages than in Systems A or B.

FIGURE II-6: SYSTEM ETHIC/ORIENTATION

SYSTEM A	• The system shows a mixture of, and slowly growing collaboration among the proponents for, these two views: – The private market ethic. Its view persists: there is no such thing as a problem that the market system won't solve if it is left alone. – The "free" library service ethic. It continues to function largely unchallenged, although charging for ILL to achieve balance between lending and borrowing is likely. • Today's painful dilemma continues: each library can serve a smaller and smaller proportion of local demand if the profession continues to embrace as a basic value that all published material must be available to patrons without charge.
SYSTEM B	• Survival of library institutions and the "free information" ethic are the key motivations. – The NPC is intended to support free or very low cost library service to a broad public. – There is a shift in the support mechanism and the locus of holdings, but no basic challenge to the collection orientation; everything is still safe in one place. • There is some weakening of the cooperative ethic. – Libraries no longer rely on each other in order to make all materials available. – Instead they rely on a single supplier external to the community. • The free market ethic probably experiences creation of an NPC as a defeat.
SYSTEM C	• The dual motivations of survival for libraries and improved functioning of the marketplace co-exist, are implicit in the NPC objectives. • A new interface emerges, which reflects a mixture of the private market and the free service ethics, but in a combination in which choice among alternative sources is as easy as using a terminal. • The system is primarily communications-oriented, secondarily collection-oriented. • Bibliographic search and finding tools take on increasing importance.

1. The Mid-Eighties Library Environment

By 1985 we anticipate that over 17,000 libraries will be linked to bibliographic utilities such as OCLC, RLIN, WLN, or their successors. These libraries all will have installed electronic terminals including, in many cases, terminals furnished by private sector organizations. All of the utilities will be capable of offering multiple services, including ILL.

About 7,000 of the libraries will have dedicated communications to a computer that either itself can accommodate an NPS order processing system and/or that can switch to the NPS system. The remaining 10,000 libraries associated with bibliographic utilities will employ very low-cost terminals, and will have capabilities to dial into packet network systems that can provide communications at costs comparable to those having dedicated communications systems. Additional characterizations of this environment are provided in the "scenario" discussions of Chapter V.

2. System A -- Non-Intervention System

In the non-intervention case, the various bibliographic utilities will offer ILL as part of the package of services they provide to their members. In order for their ILL service to be effective, they will have developed finding, access and order-processing software and data base tools with a level of sophistication comparable to that of tools which could be made available by a dedicated NPC (System B). In fact, they will gain an advantage in at least some cases by being able to tailor the finding tools to particular needs and desires of their members. Union catalogs of periodicals holdings and CONSER will have been developed significantly by that time and will provide further assistance.

The ILL systems will seek to achieve improved balance between lending and borrowing among libraries on a dynamic basis, keeping track of individual library lending-to-borrowing ratios and using, in addition, a variety of incentive mechanisms to encourage load-leveling within the system. They probably will employ a fee or credit system for this purpose. Some libraries will specialize in specific types of lending operations for a suitable fee.

Since the overall ILL system will still be based on a concept of library sharing of non-dedicated material, its most difficult problem will be that of ensuring reliable and timely service. Assurances of availability can be built up through redundancy of sources but, even though service standards will be established, these generally will have to permit slower delivery of material than can be anticipated from other systems.

3. System B -- NPC Dedicated Collection

The essential ingredients of System B have been described or implied in References 1-3. From the range of possibilities that could be developed from these references, we have chosen the following as both exemplifying the basic concept and meeting the needs for specificity required by a qualitative exercise.

The operation of System B is based on the build-up of a dedicated collection of some 50,000 titles (for the date applicable to our analyses), with the equivalent of 15-20 years of back issues. All system requests are to be serviced from this collection or from referral collections -- in libraries which have agreed formally to fulfill this responsibility on the same basis of certainty of response as the NPC's own collection. The high quality finding tool developed to support operations, and the order taking process (for terminal or telephone order entry), will reject requests which cannot be fulfilled. Because System B (and System C below) will be national systems, we permit order entry by telephone and mail; this is in contrast to System A which we treat as available only to (or through) users equipped with terminals.

We anticipate that 70% of NPS traffic will flow through existing on-line networks, that 20% of demand will be serviced by a telephone order-taking system employing WATS lines, and that the final 10% of requests will be transmitted through the mail.

Although we do not know exactly what mechanisms would in fact be employed, we have done our analysis on the basis that access to the NPC will be achieved through both dedicated and dial-in multiple-purpose terminals such as those used in System A. This is necessary for economic feasibility, since the costs of terminals dedicated only to NPC use would place a very heavy burden on use of the system. Furthermore, we believe terminal input increasingly will become an economic requirement by the mid-1980's; the cost penalty for telephone entry will be severe for most users and reliance on the mail will not provide service competition with the alternatives available by that date.

Finally, although we have considered the possible use of System B for various types of fulfillment operations other than ILL, it has been our conclusion that:

- These can at best be marginally desirable services to libraries or publishers and normally will represent a risk or cost rather than a benefit.

4. System C -- Private Sector Network

The concept behind System C is the least complete, since we have had to develop it in a short period of time and have not had the benefits of prior studies such as were applicable to System B. The system is less well-defined with regard to the mechanisms by which it could come into existence and the means used to achieve certain desirable attributes. These deficiencies, while they can influence the feasibility and acceptability of the system, do not interfere with quantitative cost-benefit analysis of the concept.

In System C, we assume some two-thirds of the ILL demand processed through an NPS will be switched to private sector document delivery organizations, with the remaining traffic serviced from a dedicated collection of some 37,500 titles. The process by which this type of system might be implemented involves:

- The development of a (potentially subsidized) communications and switching network with associated software and finding tools.
- The development of a listing of titles considered desirable to be serviced by the system.
- The offering of contracts to private sector organizations to provide fulfillment services for any or all of these titles subject to:
  - Non-exclusivity -- any organization desiring participation will be permitted to do so subject to its acceptance of NPS contract conditions.
  - Agreement by providers to supply vault copies to the NPC of all materials that will be serviced.
  - Agreement not to sell contract rights to any other organization that is not prepared to comply with all contractual conditions.
  - Agreement to pay NPS service charges for storage of vendor data and transmission of orders.
  - Acceptance of NPS service standards and mechanisms used to monitor performance against these standards.
  - Possibly, acceptance of NPS back-coverage requirements.
- The basis for price control will lie primarily in the competitive conditions encouraged by this system. These include:
  - Multiple private sector firms servicing the same titles with their prices, physical locations, and current performance (but with all listed sources satisfying NPS service standards) displayed in the finding tool (thus creating a "market" in which the private sector firms can compete).
  - The availability of ILL by more conventional means as an alternative or last resort competitor for situations where prices are viewed by libraries as being out of line.

- Contractual relationships between the NPS and specific libraries to maintain important titles in the event library retention habits change and the availability of ILL competition becomes a less effective price control mechanism.

- For those titles in which the private sector shows no interest, a dedicated collection would be established operating much as in System B. Periodically, titles in this collection would be opened up for servicing by the private sector; and when such an agreement is made, the NPC would extend its collection further into titles that had not previously been serviced.

5. Demand Characteristics

For all three systems described below, we consider two load-levels for our quantitative modeling purposes -- 4.8 million and 2 million requests filled per year. These numbers were selected somewhat arbitrarily. We estimated 2 million to be the lowest demand level at which an NPC might possibly be expected to be self-supporting of all operating costs after an initial subsidy. The higher figure, corresponding to the sixth year of operations of Reference 2, represents an upper level for the activity to be self-supporting, i.e., to be succeeding in its function, the NPC must be self-supporting at this level.

Since the demand being modeled in System A is input entirely via terminals, while some of the demand in the other systems does not, their situations are not entirely comparable. However, we believe the analyses sufficiently illustrate the sensitivities of the systems that this discontinuity will not be significant.

CHAPTER III

CRITERIA ELEMENTS

The criteria elements we have considered evolved from an initial listing which was supplemented and modified on the basis of literature review, personal interviews and the process of going through the analysis procedures. Basically, these criteria subjects can be divided into broad categories:

- general criteria elements related to the system and society as a whole; and
- specific participant-related factors.

The first of the above categories seeks to compare the three systems we have examined in terms of social benefits and costs considered in toto, with the gains and/or losses related to a particular participant sector viewed primarily in terms of the broad social impacts that result thereafter, rather than expressing the viewpoints of the participant sector itself. The latter category takes the self interests of the individual participant groups into account and thus deals with the question of system feasibility to the extent that a rallying of all participants may be necessary to achieve a successful National Periodicals System.

The General Criteria Elements are listed in Table III-1 and the Participant Sector Interests and Concerns are presented in Table III-2.

The various criteria subjects also can be divided into those that can be expressed in terms of dollar values and those which cannot be reduced to this common denominator on a broadly acceptable (if any) basis. This has been done in Table III-1 where the elements of the first of the above categories are concentrated in Part II. An analysis of these elements is presented in the following chapter, with the broader, less quantitative material discussed in Chapter V.

TABLE III-1

GENERAL CRITERIA ELEMENTS

I. SERVICE-ORIENTED ELEMENTS (Chapter V)

These elements are concerned with factors related to ease of use of, and confidence in, a system, and to the quality of service provided via libraries to end users:

1. Simplicity of access and use.
2. Breadth of coverage.
3. Assurance of availability.
4. Order and availability confirmation.
5. Timely delivery.
6. Reliability in meeting standards.
7. Assurance of future materials availability (preservation).
8. Provision of standardized supporting formats and documentation (to permit increased automation of procedures by all active participants).

II. COST-ORIENTED ELEMENTS (Chapter IV)

These elements are concerned with dollar costs and benefits affecting some and/or all participants:

1. Total "social" costs (reflecting the total of all forms of subsidies, revenues and/or costs displaced or gained by specific participants).
2. Component costs and savings for individual participant sectors (e.g., libraries, publishers, etc.).

III. IMPACT-RELATED ELEMENTS (Chapter V)

These elements are concerned with longer-term consequences of alternative approaches:

1. Congruence of system with future technological developments (e.g., ability to continually adapt relevant new technology).

41

TABLE III-1 (cont.)

2. Congruence with economic and social trends (covering factors such as: redundancy/multiple sources; level of monopoly or monolithic structure; level of competition and ease of competitive entry; vulnerability to increasing bureaucracy, etc.).
3. Implied future for library/information delivery systems.
4. Implied future for publishers and other industry participating sectors.

TABLE III-2

PARTICIPANT SECTOR INTERESTS AND CONCERNS

I. PUBLISHERS

- Changes in copyright position:
  - clarification of CONTU guidelines interpretation;
  - threat of imposition of upper limits on copyright charges, particularly if NPC copyright charges are subsidized by government;
  - threat of forced licensing of copyright with reference to an NPC/NPS;
  - threat of some NPC services not honoring copyright payments; bleed over to ILL.
- Gradual loss of control of parts of distribution system to NPS or private document distribution organizations.
- Disintermediation through direct arrangements being made between author organizations and NPS-type system or document distribution activities.

II. LIBRARIES

- Economic vulnerability: cost squeeze between rising subscription prices and acquisitions funding.
- Significant increase in required copyright payments.
- Disintermediation through increasing direct distribution to users from document delivery organizations.
- Inadequacy of preservation assurance under present circumstances.
- Inadequate control of service standards for ILL-type activities.

III. USERS

- Adequacy of subject and title coverage, and choice that this makes possible.

TABLE III-2 (cont.)

- Adequacy of geographic coverage, particularly when away from main population and academic centers.
- Timeliness of response.
- Cost of information access.

IV. DOCUMENT DELIVERY ORGANIZATIONS

- Loss of future opportunities and opportunities to exploit new technologies.
- Investment uncertainties hampering potential operations.

V. SOCIETY

- Availability of information to those who need it.
- Required subsidy levels.
- Threat of bureaucracy evolving in an NPC.
- Threat of unreasonable costs for information arising from document delivery service monopoly of, or very high publisher royalties on, specific titles.

VI. SYSTEM

- Inability to get effective movement towards development of improved services.
- Critical uncertainty areas -- copyright arrangements, publisher participation, etc.

CHAPTER IV

FINANCIAL COSTS AND BENEFITS ANALYSIS

In this chapter we provide a financial cost and benefit analysis of the three systems described earlier, covering both overall financial costs and benefits and component costs and benefits of individual participant sectors. After a brief description of our approach to the problem, we present material on:

- development of quantitative data in key subject areas;
- cost and revenue changes faced by the different participant sectors;
- summaries of total costs and revenues; and
- a summary of the findings from this quantitative analysis.

A. APPROACH

The accurate estimation of costs and benefits for a well-defined system whose influences will be confined within a single organization is often a difficult process. When the analysis is concerned with relatively loosely defined systems that will have impacts on large numbers of participants with very different characteristics -- and that will, by their very existence, change some of these characteristics in a dynamic fashion -- the resulting cost benefit analysis can be useful but it obviously is subject to severe limitations. Although we have tried to utilize the available data effectively, we consider our goals as being quite restricted:

- To provide a framework in which all meaningful costs and benefits to all participants are at least noted and brought into the open in specific terms.
- To achieve at least some order of magnitude estimates of dollar impacts.
- To sum the component costs so as to develop a sense of the total costs and benefits involved and their sensitivity to critical variables.

- To note the key points where resolution or changes of practices and/or pricing can have major consequences, and
- Finally, to develop the analysis in a modular form, so that alternatives to our own values can be inserted with minimum effort should better data than we have had access to become available, or other judgments be substituted for our own.

This last feature is particularly important. With the short time available on this assignment, it has not been possible to examine all the data sources whose existence has been called to our attention. We have made an effort to use those sources that have been described to us as the most broad-based and acceptable but recognize that more recent information from sources we did not tap may provide more relevant inputs. We have attempted to compensate for this by presenting our analysis in a format that will make incorporations of alternative estimates as simple as possible.

The basic procedure employed in our cost-benefit analysis was to consider each significant participant sector individually, and to note for each the manner in which different categories of costs and revenues might be changed as a function of which of the systems described earlier were to become "dominant." For some of these categories, a complete analysis was developed; for others it was determined either that the impacts would be small or that the category could not be analyzed in meaningful quantitative terms. The latter were then dealt with in more qualitative fashion or were moved to Chapter V.

Our basic outputs are described for a date when the systems being considered would be operating at a level where full economies of scale should be achieved. We occasionally term this date 1985, and use the schedule from Reference 2 to describe the general system growth pattern. However, it should be noted that this does not represent our firm estimate of the date at which the systems could be operating or the specified performance achieved; the calendar date is used simply as a convenient descriptor.

Another inevitable problem in the analysis concerns how inflationary impacts should be incorporated. Inflationary factors will affect different parts of the various systems in different ways. Subscription prices, for example, have been increasing more rapidly than the inflation rate; electronic equipment, especially when measured in terms of capabilities, has been decreasing in price. While adjustments could be made to account for these factors, we have not had adequate calendar time on this assignment to perform such a task effectively. As a result, except where noted, we employ current costs and prices. In the few situations where some form of adjustment seemed particularly important (such as for subscription prices) we have attempted to eliminate general inflationary effects so that projected future prices include only non-inflationary change factors.

In Table IV-1, we list the participant sectors influenced by the development of an NPS (excluding end users, for whom no acceptable quantitative estimates can be made concerning costs and benefits and who, therefore, are treated in Chapter V) and the areas of activity in which their costs or revenues might be changed depending on what type of system evolves. Before examining these costs and revenue items, however, we will present some general quantitative data on a number of critical subject areas, namely: Demand Factors, Library ILL Costs, Copyright Charges, and System Costs.

B. GENERAL QUANTITATIVE BACKGROUND

1. Demand Factors

(a) Overall Demand Factors

The rapidly rising level of ILL activity, and the unbalance among institutional lending-borrowing ratios, have been major incentives behind the drive to develop an NPC. Both References 1 and 2 note these factors and Reference 2 presents some specific forecasts of ILL demand for the period out to 1985. Even these estimates, however, do not tell the full story; and before we start our analysis, it is useful to look at the total picture and review just which parts of it

TABLE IV-1

PARTICIPANT SECTORS AND ACTIVITIES SUBJECT TO COST AND/OR REVENUE CHANGES

A. PUBLISHERS

- Copyright charges collected.
- Net subscription revenues.
- Net advertising revenues.
- Distribution costs for current issues and reprints.

B. DOCUMENT DELIVERY SERVICES

- Net revenues from document delivery activity.

C. SYSTEM

- Start-up and transition costs.
- Operating costs.
- Break-even user charges.

D. LIBRARIES

- Copyright charges paid.
- Borrowing and lending costs.
- Maintenance/preservation costs.

E. PUBLIC (subsidies)

- Start-up and transition subsidies.
- Potential operating subsidies.

we are examining. The area of concern to us, illustrated in Figure IV-1, is just a small part of this picture:

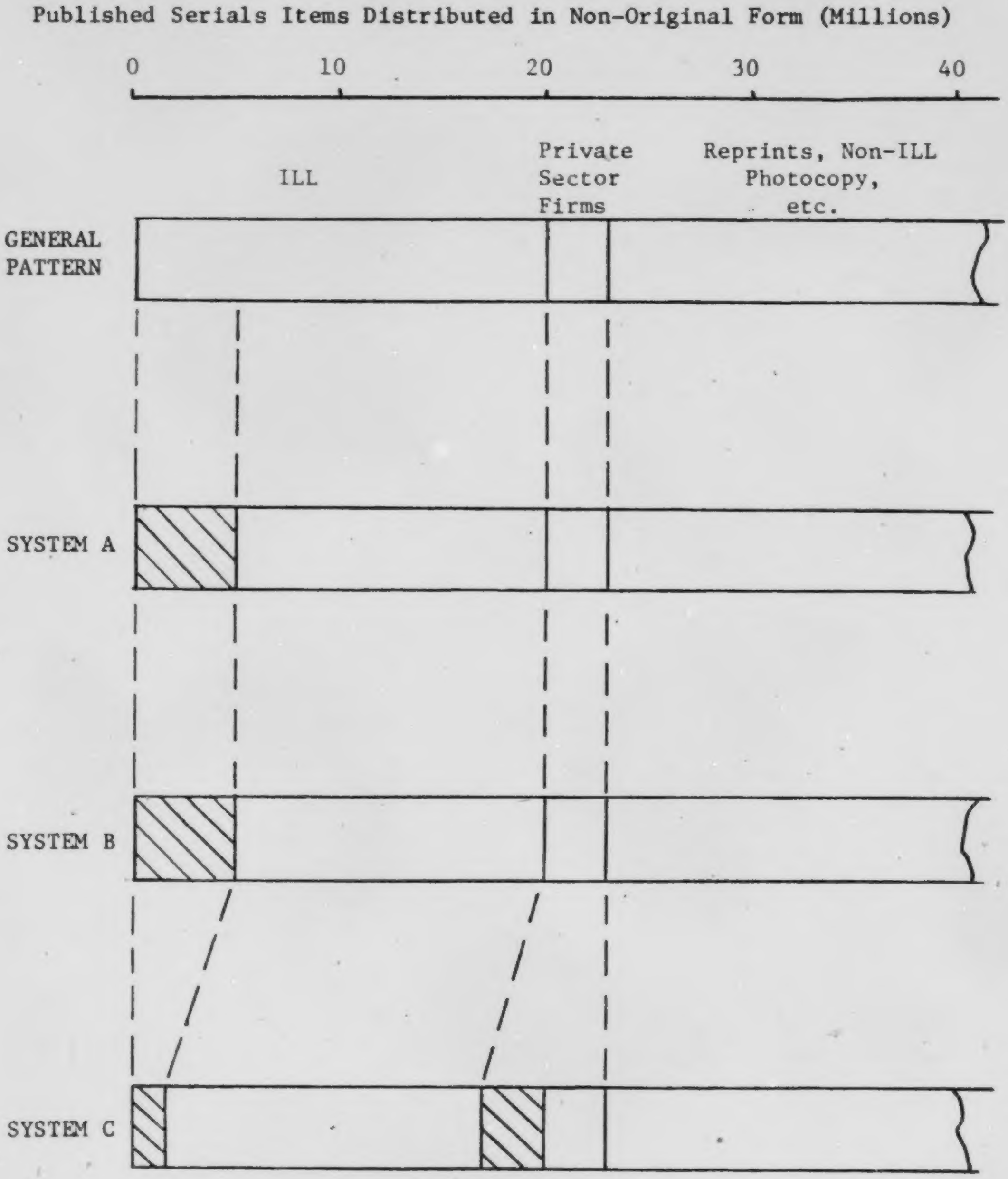
- By 1985, well over 40 million "items" of published serials information are likely to become available to users yearly in a form other than that in which they were originally produced.
- Some 20 million of these will represent ILL items.
- About 3 million items will be distributed by private sector document suppliers.
- The remainder will be in the form of reprints from authors and publishers, photocopies from library and private holdings, and similar informal operations; and a growing number of items will be handled by electronic transmission to user copying devices.

The systems we have examined will impact only a small portion of this flow and will do so in a very selective manner:

- For System A, we look at 4.8 (or 2) million items which represent a portion of ILL that flows through highly automated ILL systems involving libraries, many of which will have other automation tools such as circulation control.
- For System B, we consider a situation where 4.8 (or 2) million items are transferred from ILL to an NPC; and
- For System C, we consider a case where 4.8 (or 2) million items are moved from ILL to an NPS, from which 3.2 (or 1.33) million are switched to private sector suppliers and the remainder serviced by a residual NPC collection.

Thus, in all cases, quite major ILL activity (perhaps, in part, as fully automated as in our System A model), private sector operations, and the less formal mechanisms will still be in place. However, for simplicity and convenience we must narrow our view; and in the remainder of this chapter we confine attention to that portion of the flow that is defined as moving through our selected systems.

FIGURE IV-1: SEGMENTS OF TOTAL ACTIVITY COVERED BY SYSTEMS STUDIED


Published Serials Items Distributed in Non-Original Form (Millions)
0
10
20
30
40
ILL
Private Sector Firms
Reprints, Non-ILL Photocopy, etc.
GENERAL PATTERN
SYSTEM A
SYSTEM B
SYSTEM C

Cross-Hatched Areas Indicate Demand Serviced by Systems

Note that in any option, only a small proportion of the flow is considered, i.e., that displaceable by an NPC.

(b) System Demand Level

The particular methodology we are employing, whereby we examine the different systems at two levels of demand (4.8 million and 2.0 million filled requests per year), avoids the necessity of making specific forecasts of future overall demand or of the percent of that demand which might be serviced by an NPS. It seems clear that demand is growing and that a successful system could very well face the higher of the two requirements within a time frame of three to five years after it commenced operations. An unsuccessful system, of course, would achieve very low usage no matter what overall demand eventuates. We note, therefore, only that the demand figures given in Reference 2 appear to be reasonable possibilities, as does the goal of servicing approximately 25% of that demand through an NPS, should one be developed.*

Given that the system demand picture is established, there still are several parts of our analyses where other demand characteristics are needed. These are described below.

(c) Distribution of Requests

The distribution of demand for specific titles has been studied widely and there is general acceptance that this demand can be approximated effectively in terms of a log normal distribution (Reference 2 and others). Table IV-2 presents statistics on demand derived from this distribution. It is prepared in terms of the characteristics of filled demand; in fact, however, the proposed collection of 50,000 titles probably will fill only about 95% of all requests by title and this amount will be reduced further because of

---

*Early demand for OCLC ILL services appears entirely compatible with these statements -- weekly request rates of over 10,000 have already been encountered, and there is no reason why this level should not continue to grow as the system is improved and users develop more skill and understanding of its capabilities.

TABLE IV-2

DEMAND CHARACTERISTICS OF 50,000 TITLE COLLECTION

	% of Requests Made*			For Demand Rate of 4.8 Million/Year		2 Million/Year	
Ranked Segment	Segment	Cumulative	Cumulative & of Titles	Segment Total	Per Title	Segment Total	Per Title
0 - 2,500	46%	46%	5%	2208K	883	920K	368
250 - 5,000	12	58	10	576	230	240	96
5,000 - 7,500	9	67	15	432	173	180	72
7,500 - 10,000	5	72	20	240	96	100	40
10,000 - 12,500	5	77	25	240	96	100	40
12,500 - 25,000	13	90	50	624	50	260	21
25,000 - 37,500	6	96	75	288	23	120	10
37,500 - 50,000	4	100	100	192	15	80	6

*Percentages rounded off.

Source: Log-Normal distribution equivalent to Reference 2 data.

requests for items of greater age than those contained within the collection (discussed later).

The material in Table IV-2 has been divided into ranked use segments for convenience in performing some of the analyses described later. The relatively high demand levels per title, arising from the concentration of demand, are evident for even the lowest categories. However, it also is clear that the concentration of most demand in a small number of titles raises a classic problem. For a dedicated collection:

- In the high demand range, almost all costs will be associated with processing of requests; acquisition, storage, and preservation costs for these periodicals will be insignificant when allocated over the demand for these items.
- At the low end of the scale, the opposite, of course, will apply; at this end, the acquisition, storage and preservation costs will tend to dominate the situation.
- The above well-recognized pattern illustrates one of the important issues to be dealt with -- the desirability and extent to which use of high demand items should cross-subsidize use of low demand items.

(d) Age Characteristics

The age characteristics of demand also have been investigated in numerous studies, of which one of the most recent is Reference 6. Table IV-3 provides material from that reference in the form of average values for a mix of scientific and technical, and social and life sciences, periodical literature.

The distribution of usage shown in Table IV-3 is better fit by a logarithmic decay (e.g., a distribution that leads to a straight line on log-log graph paper) than by an exponential decay process (which leads to a straight line on semi-log graph paper). Our own limited analyses support this viewpoint even though the exponential decay distribution has been employed quite commonly. We believe the

TABLE IV-3

CUMULATIVE PERCENT OF LIFETIME USE AS A FUNCTION OF PERIODICAL AGE

Age-Years	Cumulative Use - %
1st year	48%
2nd	60
3rd	68
5th	78
10th	87
20th	97

reason for this is that the two distributions lead to very similar use patterns over the range of years which has been most studied for ILL, with differences showing up only during the first few years of a periodical's life, where ILL activity has been low, or for very old periodicals, where the data are limited and exhibit a great deal of scatter.

In any event, the distribution above, although it may not apply to all types of periodical literature, illustrates the very intensive use of material during its early years and we believe this phenomenon is generally present. Thus, a collection which goes back 20 years probably will satisfy 97% of true demand, although it will provide a somewhat lower fulfillment rate for ILL purposes because of the latter's bias towards demand for medium age and older items.

The use of demand figures in terms of filled requests avoids dealing directly with this problem. In practice, as much as 20% of requests for titles represented in an NPS dedicated collection (with 15-20 years of back copies) may not be serviceable from that collection (and, for the purposes of our estimates, will be treated as though never submitted to the NPS).

(e) Split of Demand -- System C

System C has been designed deliberately to encourage strong participation by private sector firms in fulfilling a major component of the demand for ILL, although these firms would be subject to a variety of control conditions in an effort to assure that this is done without long-term social disbenefits. There is no firm basis for estimating how demand would be split, if such a system arose, between private sector firms and the residual dedicated collection of titles that the private sector is unable or chooses not to serve. One might expect, however:

- Significant concentration of private sector interest in the high demand segments of the overall collection.
- More limited and scattered interest in medium demand items, particularly where these permit firms to build a more complete subject-oriented collection of titles, to support particular relationships with publishers, or for similar reasons.
- Finally, continued private sector interest in a large number of specialized, low overall demand items, many of them outside the scope of the anticipated collection, in situations where special positions have been achieved or the interests of a particular entrepreneur are involved.

The split which we have assumed must be regarded as illustrative only. It has been chosen not only to comply with the above rationale, but also to create a severe situation for the dedicated collection in terms of both loss of demand and loss of ability to cross-subsidize costs directly within a single collection. The selected distribution involves:

- Coverage by the private sector of 6500 of the 7500 titles in greatest demand. These segments very likely would be serviced by a multiplicity of competing private sector firms, and their net impact is to divert 58% of the total system demand away from a dedicated center.

- Coverage by the private sector of 5500 titles of the segments between the most heavily demanded 7500 titles and the most heavily demanded 25,000 titles. This results in diversions of an additional 7% of demand.
- Coverage by the private sector of 500 scattered titles in the lower half demand category, leading to minor diversions.

In summary, the diversion pattern we have employed involves approximately 12,500 titles (25% of the total) and results in a diversion to the private sector of 67% of the demand placed on the system.

It should be noted that, although the above represents a very strong diversion of NPC demand to the private sector supplier firms, good arguments can be presented that it still understates the capabilities of the latter. The diversion amounts to 3.2 million items in the high demand (4.8 million) case; and this is just about equal to the business the private sector already will be doing if no NPS diversion takes place. The total collection covered by the private sector in the above split (12,500 titles) is less than the number of titles already served by just one -- although the largest -- of the existing private document delivery services.* Given that it appeared to offer a good opportunity, one could anticipate significant increases in the investments and activities made by private sector firms in order to provide services of the type envisioned in System C. The question of whether the private sector can do the entire job is not so much in doubt as the questions of associated prices, dedication to preservation, maintenance of service standard, and other factors important to librarians.

Finally, the extent to which private sector firms would be willing to accept the constraints of and join a system such as System C cannot be established in advance. As noted earlier, we have been able only to provide an illustrative example, and the specific case we studied should not be considered as representing either an assured level of private sector participation or a maximum level of their capabilities.

---

*UMI states that they carry some 13,200 serials in their collection.

2. Library ILL Costs

The costs of concern to us here are the total costs per transaction for both borrowers and lenders using each of the three systems being analyzed.[*] To estimate these costs, we start by determining current costs and then make adjustments to reflect the benefits anticipated by moving to one of the future systems.

(a) Current ILL Costs

Table IV-4 presents ILL cost data from three references. The data are as presented in these reports except that:

- The 1968 data have been modified to transfer $1.00 of photocopying costs from the borrowing library category to the lending library category in order to make this data comparable with the other entries and to reflect better the division of activity of future systems.
- The 1977 entry is a direct average of the three library costs reported and this average has been revised to incorporate a 35% overhead (on non-photocopy costs). The 35% is our estimate of the overhead on labor plus fringes (which are not separable) which would make these data correspond to those with 50% overhead on direct labor used in the other two studies. Thus the overhead incorporation puts all the data on a comparable basis and results in what we believe is a more meaningful estimate of the true social costs of the various systems.

---

[*] Copyright costs are covered later, so they are not included in this section.

TABLE IV-4

ILL COST DATA PER FILLED TRANSACTION

Borrower Library	Lending Library	Total	Report Date	Reference
$ 4.21	$ 3.45	$ 7.66	1968	5
7.61	5.82	13.43	1972	4*
9.20	Not available	Not available	1977	6

---

*This source reports ILL costs for a combination of books and periodicals; we could find no means to separate the two categories but believe the data are still useful. The data used were those for large academic libraries.

Since the most recent (1977) data cover only borrowing libraries, we must make an estimate for 1977 lending library costs. Although we recognize that there have been significant changes between 1968 and 1977 in the nature of ILL activities and their cost components, our only means to do this is to use the ratio of borrowing to lending library costs from the earlier data. These are fairly consistent (1.22 for 1968 and 1.31 for 1972). Using a factor of 1.25, we estimate that the lending library costs amounted to $7.36; so the total ILL costs amount to approximately $16.56. Examining these total costs we note that ILL costs increased by a factor of almost 2.4 between 1968 and 1977, or at a rate of about 10% a year -- significantly higher than the inflation rate.** To bring all the costs to a 1978 base, we add 10% to the 1977 values, giving us a current total cost of $18.20, with lending library costs of $8.10 and borrowing library costs of $10.10.

**The GNP Implicit Price Deflator, as reported in the Statistical Abstract of the U.S., leads to a factor of about 1.75, or an inflation rate of about 6% for the time period involved.

In viewing these costs it should be recognized that there will be large library-to-library variations. The references cited above all apparently were forced to use data with suprisingly large variability but give no detailed explanations of the reasons for the inter-library differences.

(b) Projected ILL Costs

The introduction of new systems can affect library ILL costs in several ways for that fraction of ILL that goes through the new systems. In particular:

- For System A, extension of currently planned activities should significantly decrease borrowing library costs, and especially their ordering costs which can be calculated (from Reference 4) to amount to about two-thirds of the total of these costs. This will result from simplification of procedures for helping patrons, order preparation and handling (verifying bibliographic data and potential lending sources, preparing and forwarding requests, checking records, etc.), and from automation of the reordering process in cases where the initial request cannot be filled. Impacts on lending libraries will be smaller but there should be significant benefits in the areas of verification and record keeping and from more accurate borrower information on their holdings. The availability of automated circulation control systems also can be of importance in reducing ILL lending costs.
- For Systems B and C, the same benefit will result for the borrowing library, since we assume that equivalent finding and other support tools will have been developed for all the systems. However, since there will be no lending in these systems, all lending library costs will be replaced by National Periodicals System service fees (even when service is through an NPS referral library), and/or private document delivery service charges.

To make the necessary adjustments, we took the following steps:

- First, to assist in estimating the savings possible in future systems, it was necessary to divide the borrowing library efforts into those for filled requests and those for unfilled. Data on this subject varied widely; for example, Reference 4 indicated 64% of requests were filled, the libraries in Reference 6 filled 74%-80%, and Reference 7 indicated 84% -- although, as is not unusual with library data, we are not certain that the data are strictly comparable. Since the last of the above data are for a relatively specialized area of literature, for which we believe the fill rate may be higher than for average usage, we have employed a (perhaps high) value of 80% for estimating an average 1978 periodicals ILL fill proportion. This implies that there will be 1.25 requests made per request filled with current systems.

  As noted earlier, data in Reference 4 suggests that about two-thirds of borrowing library costs are related to processing of orders. However, a second processing, made after a first effort has been a failure, should involve less cost, and we have used a value of one-half the original cost for this purpose. Using these numbers, we can calculate that the total ordering-related costs for a request that is filled on the first attempt now amount to $5.98 and that for later requests, in cases where previous orders were unfilled, the ordering costs will be $2.99.*

---

*For each initial order, at cost X, there will be an additional 0.25 orders at cost X/2; the total order costs will therefore be 1.125X which must equal 2/3 of the total borrowing costs ($10.10) or $6.73. From this, X = $5.98. The same results could be achieved by different combinations of fill factors and repeat ordering costs, such as a 75% fill factor and repeat order processing that cost 3/8 as much as the original order processing.

- We do not yet have experience to determine how effective automated ILL tools will be in reducing library costs, but information on this subject should begin to emerge from OCLC operations in the near future. For our analysis here, we have examined the detailed ILL labor data reported in Reference 4 and have made estimates of the changes that appear possible in each component described therein. On this basis, we estimate that improvements in the ordering process will reduce that component of the item ordering costs by two-thirds for original orders, and that automation of reordering will essentially eliminate reordering costs. This has the impact of reducing ordering costs by \$3.99 for initial orders and by \$0.75 (taking into account that reorders will be a fifth of all orders) for reorders, for total ordering savings of about \$4.75. Other borrowing costs we estimate will be reduced by about 1/3, or \$1.09, leading to total borrowing library savings of \$5.83.
- For lending libraries, the cost reduction will be somewhat less; we estimate that 30% savings will result from the items described earlier, leading to a reduction in costs of \$2.45.
- Combining lending and borrowing savings, total savings per loan will amount to some \$8.28, reducing ILL total costs to \$9.92.
- Thus, for:
  - System A, library costs = \$9.92 per successful transaction plus ILL system service charges; and for
  - Systems B and C, library costs = \$4.27 plus relevant NPS fees and private document delivery charges per successful transaction.

Another possible improvement to the System A ILL costs, but one which is not considered herein, would be based on a library sharing system whereby individual libraries in different regions agreed to accept responsibility for maintaining specific periodicals in what amounts to dedicated form -- isolated from the stacks and under control so as to be easily and continually available. Such a measure might cut the lending library costs by perhaps 50% through decreasing search time, eliminating unfilled order costs and permitting greater efficiency in copying arrangements. It also would speed timeliness of response. However, this type of practice does not seem to have been successfully developed in the past. Furthermore, the system, if implemented, might easily make libraries more vulnerable to litigation for "systematic photocopying of copyrighted materials," leading to liability for copyright charges. If libraries were to pursue such a course, and to pay copyright fees for items copied from these dedicated collection segments, they would in effect be creating a distributed NPC on their own.

3. Copyright

The subject of copyright raises some of the more serious issues that will be encountered in the development of an improved system for meeting library ILL needs. Furthermore, the problem is not subject to any definitive form of quantitative analysis at the present time. The copyright law, and the CONTU guidelines that currently establish application of the law to libraries, are sufficiently vague so as to be subject to a variety of interpretations; and extreme versions of these interpretations are being stoutly maintained in many areas by librarians and publishers. Unless an effective conciliation of views can be developed, the solution of this fundamental area will have to be left to Congress or the courts; and the court decision may be made at an unfortunately late date relative to commitment to any form of new system.

(a) Eligibility

The most complete report developing basic data on copyright copy eligibility is Reference 8, where it is noted that out of an estimated 3.77 million domestic ILL photocopies of copyrighted serial items, some 505,000 (13.4% of the total) were for items published less than six years previously, not for replacement or classroom use, and for which more than five copies were made. Beyond this number, opinions diverge:

- Factors potentially lowering eligibility:
  - The analysis does not appear to relate the copies made by title to the individual receiving library, which can be deemed the organization to which the exemption should apply.
  - The analysis does not take into account the matter of whether the requesting library already subscribes to a periodical; under some circumstances, this can offer a loophole to escape eligibility for charges.
- Factors potentially raising eligibility:*
  - Special libraries, for most of which the CONTU regulations appear unlikely to apply, are included as though the exemptions did apply to them. If special libraries were not treated as other libraries, the fraction of items eligible for copyright fees indicated in the report would be increased from 13.4% to 29.6%.
  - Some 1.925 million copies (51% of the total) were for items more than five years old. These items have been left in limbo; the CONTU rules are silent on them, leaving scope for opinions that range between total eligibility and zero eligibility.

In terms of actual events, it appears that very few libraries are paying copyright charges. The 1978 annual review of Copyright Clearance Center, Inc. (Reference 9) indicates, for example, that: only 796 locations registered with the CCC, only 198 reported any photocopying transactions, and only 49 locations reported an average of 10 or more copyright eligible copies per month during 1978. In all cases, the majority of reporting was provided by industrial organizations.

---

*We ignore here items copied for local or intra-library use; these are very important to publishers and libraries but are not concerned with ILL and an NPS.

Under these conditions, it seems clear that any estimates we make are highly likely to be dissatisfying to all participant sectors! Nevertheless, we believe it important to illustrate the significance of this subject and have, therefore, used the following assumptions.

- For System A (and presumably for other forms of ILL under our assumptions):
    - We assume that 50% of special (industrial) library copying of copyrighted items will, in due course, lead to payment of copyright charges. This is based on an assumption that special libraries are not eligible for the CONTU provisions but that full reporting will be sufficiently difficult to enforce, and the reporting process and associated control mechanisms sufficiently onerous for the special libraries to apply, that in approximately half of all cases charges will not be paid.* The fraction of items borrowed by special libraries that are copyrighted is about 95% (Reference 8).
    - For all other libraries, we assume that charges will be paid on 3% of all copyright items under five years old, and that no payments will be made on older items. This assumption is based on a judgment that vagueness and uncertainties in interpretation of the CONTU guidelines will permit libraries (other than special libraries) to minimize their copyright liabilities. The fraction of

---

*The estimate that as much as 50% of charges will be paid is based on the fact that a limited number of well known and easily recognized individual organizations probably are responsible for a majority of the ILL copies special libraries receive.

items borrowed by these libraries that are copyrighted is 80% (Reference 8).*

- The resulting computation, using Reference 8 data, leads to copyright charges being paid on 17% of all copy items using System A, with special libraries responsible for 90% of the total charges paid.

- For Systems B and C, we assume that a copyright payment will be made on all copyrighted items (83% of the total) passing through the system, whether by a dedicated center (System B) or by a mix of the dedicated center and private document fulfillment organizations (System C). While in no case have proposals for an NPC been prepared to state that the center would be performing "systematic copying," in all cases there has been agreement that copyright payments will be made.
- For all systems, the eligibility described above is reduced by 12% to account for items that are copyrighted but for which no charges are made.

In summary:

- For System A, 15% of all ILL will result in copyright payments made by the borrowing library (with special libraries responsible for 90% of the total); and
- For Systems B and C, copyright payments will be made on 73% of all transactions.

(b) Copyright Charge Levels

Copyright charge levels present another area of major uncertainty, and have a potential for a high degree of future volatility. At present:

- Several major private sector document delivery organizations report current average license fee payments of $0.60 to $0.90 per item copied, with payments usually specified as a percent of the price charged by the firm (sometimes less a service charge). The titles offered by these firms may have a bias towards excluding (or being excluded from offering) periodicals for which much higher payments have been asked. If it becomes important for delivery organizations to add or maintain new titles with higher copyright charges, and if they can reach agreements with publishers to do so, it is likely at least a portion of these charges will be passed on directly to the customer.

---

*For academic libraries the fraction is about 70%.

- The Copyright Clearance Center annual review indicates average charges of about $2.00 an item for reported items, but with a very wide spread.
- The AAP is insistent that copyright owners be free to set their own charges. While a wide variation in copyright charges is easily justified, since there is no reason why use of an item from a periodical with a $12 subscription should cost the same as one from a $200 subscription publication, the range of differences in publisher attitudes that must be anticipated will make very difficult any process of simplification, much less standardization, of charge levels for an NPS.

For purposes of analysis, we will assume that:

- For System A, average copyright charges equivalent to those paid to the CCC (e.g., currently averaging $2.00 per eligible item) will be paid.
- For the dedicated centers of Systems B and C, we will assume an average charge of $1.20 per transaction, reflecting a mix of: (1) items at the same rate as the current licensing charge to private sector delivery organizations, plus (2) items with higher charges to meet particular publisher requirements. The use of lower overall charges than for System A is based on the expectation of benefitting in negotiations from charging for all items and from providing collection efficiency for publishers through the NPS.

- For private sector delivery organizations participating in System C, we assume that a per-item charge of $0.25 will be added to current fees (which include license payments) to account for the addition of more titles requiring higher payments than the current mix, bringing the total to $1.00.
- In all cases, we will increase the copyright charges in proportion to expected non-inflationary increases in subscription rates. These can be estimated from Reference 10 (assuming continuation of past trends) as amounting to 2½% per year, or about 20% between now and 1985.

In summary:

- For System A, copyright charges averaging $2.40 will be paid on 15% of all ILL, with essentially all of these payments made by special libraries.
- For Systems B and C, copyright payments will be made on 73% of all transactions with:
  - copyright charges of $1.45 for items processed through a dedicated center; and
  - copyright charges of $1.20 for items fulfilled by private sector document distribution firms.

While these values necessarily have been based on assumptions backed by very limited evidence, the format in which we present results permits easy sensitivity testing and/or use of other values.

4. System Costs

With the calendar time and effort available to us, our approach to system costs had to be focused on seeking to check and modify existing material rather than attempting to develop preliminary system designs from scratch. In the process, attention was focused on System B -- in part because of the careful analysis made in Reference 2 and in part because a major element of System C can be treated as a scaled-down version of System B. We have, however, made a number of modifications of which the most important are in the "front end" processing operations of the systems.

This was needed because of our belief that an NPS must utilize the resources of existing bibliographic utilities, rather than seek to impose new communications and terminal costs on users. An NPC dependent on mail entry for a large fraction of requests would run counter to all current technological and economic trends. A requirement for use of dedicated terminals would inflict extra costs on all but the largest libraries and might easily make an NPC less competitive than other systems for many of its customers. Once a multipurpose terminal is accepted as offering the most sensible approach, economic advantages will accrue from use of existing local and regional communications networks -- and this leads directly to the bibliographic utilities (most of which already are likely to have made similar arrangements with private sector delivery systems by the date of interest to us).

In view of the above, we will start by considering these front-end costs and treat them as applicable to all three systems. We then will examine System C in detail and thereafter provide further modifications to develop System C costs.

(a) Front-End Costs

Existing service charges for the only operating electronic ILL system (OCLC) amount to $0.94 per transaction. We have checked this service charge against other high transaction rate network system charges and consider it reasonable for the type of operation involved. Using this as a starting point, we estimate the following as applicable to the future systems:

System A - $0.90 service charge, reflecting modest technical improvements and economies of scale.

System B - The high volume characteristics of, and more limited front-end services required by, an NPC should permit negotiation of a lower price with the bibliographic utilities and we, therefore, estimate a service charge of $0.75.[*] This figure, however, applies to only the 70% of traffic that we estimate will be provided through terminal inputs. For the 20% submitted by telephone, our estimate of the costs to enter this information into the system, including the "negotiation" with users concerning errors in their inputs, will amount to $1.50 per request. This estimate is based on costs incurred by other organizations that handle large numbers of highly structured order entries by telephone. Finally, for the 10% of entries made by mail, we estimate a cost of $0.50. This again is based on the experience of other order entry activities, with the charge including the costs of dealing with entry errors and returning erroneous or unfillable requests to the sender.

The weighted average of the above costs amounts to some $0.88.

System C - For that part of the system that transmits inputs to private sector organizations, an additional $0.05 communications cost would be required, using batch transmission or a polling or interrogation system.

The final front-end communications costs, thereafter, amount to:

- System A - $0.90;
- System B - $0.88;
- System C - $0.88 for orders entering the dedicated collection and $0.93 for orders transmitted to the private sector.

(b) System B Costs

Our approach to System B costs has been to take the data presented in Reference 2, making minor modifications as appropriate, and then allocate all these costs into three categories: acquisition, preservation and access. The cost allocation shown in Table IV-5 illustrates the process. The resulting category totals give us a

---

[*] In our analysis, we treat this as a fee users would pay the utilities; it could, of course, be packaged with the NPC fee if this was preferable.

TABLE IV-5

SYSTEM COSTS - Millions of Dollars
(Excludes Costs of Front-End Communications)

Item	Ref. 2 Costs Year 5	ADL Adj. Costs	Allocated Costs		Access.
			Acquisition	Presentation	
Directly Allocated Costs					
Supplies	0.095	0.400	0.120	--	0.280
Communications	1.725	0.225	0.045	--	0.180
System Equipment	0.250	0.250	0.025	--	0.225
Other Equipment	0.425	0.425	0.212	--	0.212
Collection Development	2.095	2.095	2.095	--	--
Preservation	0.085	0.085	--	0.085	--
Mail	0.428	4.642	0.064	--	0.578
TOTAL	5.103	4.122	2.561	0.085	1.475
Oper. Personnel:					
Number	125.5	153.5	54	2	97.5
Percent	--	100%	35.2%	1.3%	63.5%
Central Costs*					
Personnel Costs	2.740	3.300			
Insurance	0.012	0.012			
Heat, Light, etc.	0.044	0.044			
Outside Contracts	0.050	0.050			
Contingencies	0.050	0.050			
TOTAL	2.896	3.456	1.216	0.045	2.195
TOTAL ALLOCATED COSTS	$7.999	7.578	$3.777	$0.130	$3.670

Acquisition Cost per Title** = $3.90M/50,000 = $78/Title
Access Cost per Access = $3.670 M/2.7M = $1.36/Access

---

[*] Central Costs are allocated on the basis of operating personnel devoted to the different activity categories.

[**] Includes Preservation.

Source: Reference 2 plus ADL adjustments.

basis for establishing acquisition costs (with or without preservation) per title for a 50,000 title collection, and costs per transaction for the 2.7 million requests applicable to the cost data we employed. These numbers were then checked against some rough build-ups of costs (e.g., unit acquisition costs based on subscription costs, technical processing, microfilming of the acquisitions, and publisher relations costs) to assure reasonableness. Finally, they were checked against current private sector costs, making allowances in the process for the scale economy and subsidy benefits of the NPC.

By using this process of splitting all NPC costs into acquisition costs per title and transaction costs per request, we have a simple way for scaling up or down the cost impacts of having different collection sizes or user demand on the system, provided only that the values used are not so different from the base data (about 50,000 titles and 2.7 million demand) so as to change scale economies.

Returning to Table IV-5, the modifications that we made include:

Supplies

The allowance for supplies, including components such as preparing accessions microfiche, catalogues, user manuals, etc., and fulfilling 2.7 million, nine-page requests annually, appears low and we have increased the supplies allowance from $95,000 to $400,000.

Communications

Because a major part of the communications will be handled through existing networks, and will be paid for through the fees provided them, we have reduced the communications costs from $1,725,000 to $225,000.

Mail

For mail service we have increased the costs 50% to $642,000, part of which is in anticipation of an increase in mail rates above inflationary factors by about one-third by 1985. (This increase, based on a number of studies made for the USPS, arises because mail costs are strongly influenced by the number of points to which deliveries are made, and this number is increasing even though the volume of mail is not.)

Other Allocatable Items

For system equipment, other equipment and preservation and collection development, we have made no changes except, as noted below, through making some changes in the personnel costs associated with these equipment categories.

Personnel Costs

We have made two changes in personnel costs:

- First, we believe it important that a publisher relations activity be established within the Resources Development and Preservation Division. Publishing is a relatively volatile industry, requiring continual attention for many purposes including maintenance of records and negotiation of license renewal agreements. Based on private sector experience, we estimate that an activity of at least 20 persons would be required to fulfill this function, costing about $400,000 a year.

  Furthermore, during the collection build-up period, when initial publisher arrangements are being negotiated, the full strength of this department will have to be available; the establishment of initial agreements will require a great amount of effort. (This factor is reflected in our Start-up and Transition Costs covered later in this section.)
- Second, we do not believe adequate provision has been made for continuing maintenance support and improvement of system and applications software and have estimated that an additional eight staff costing $160,000 a year will be required.

Other

Although we believe that the contingency and outside contracts categories are too low for safety (especially since no specific allowances for travel, outside legal assistance and a number of other activities are provided) we have left all other overhead-type costs unchanged from Reference 2.

The total allocated costs reflected in Table IV-5 amount to $78.00 per title and $1.36 per transaction (ignoring, of course, the front-end charges discussed earlier). We use these cost elements, in a later section, to scale to specific sizes of collections and demand, and to then establish the break-even fees that the NPC must charge to recover full operating costs.

(c) System C

Costs for the dedicated collection of System C incorporate a number of additional modifications:

1. Communications costs are increased by $90,000 a year to reflect communications linkages and services the system would provide sector document distribution organizations.
2. An additional $300,000 charges for system support, maintenance and improvement is incorporated because of the greater complexity of programming and updating required when incorporating competitive vendor data in a network system. (An equivalent increase in initial programming costs is reflected in the Start-up and Transition Costs.)

The above costs are all allocated to the access activity; the acquisition cost per title, therefore, is left unchanged but the unit transaction cost is increased to $1.50.

(d) Start-up and Transition Costs

System B

We treat these costs as arising over a period of four years and, again, follow the pattern of using Reference 2 data for System B as a starting point, making modifications thereafter where our judgment or data suggest somewhat different costs.

The total operating expenses for the first four years in Reference 2 amount to $20.8 million. In addition, $6.75 million are expended for capital equipment (for facilities, furnishings and office equipment) in the first two years, leading to a total of $27.55 million.

During the same period, in years three and four, some 2.1 million requests are filled. Since we do not believe an NPC can be successful if its initial charges are higher than those anticipated in the longer run, we will employ a low starting service fee of $3.50 (including copyright charges) during the start-up period. With this fee, some $7.35 million will be recovered. However, since copyright must be paid at a rate of $1.06 on the 2.1 million requests, the above figure will be reduced by $2.22 million to $ 5.13 million.

The net effect is total expenditures of $27.55 million in the first four years and total revenues of $5.13 million. The difference, $22.4 million, represents the starting point for calculating the required subsidy.

Before completing the process, however, we have made the following modifications:

- We believe that establishment of favorable publisher relations and development of suitable initial licensing agreements will cost about $1.25 million during this period. However, we deduct $250,000 as an allowance for related costs already incorporated in the budgets.
- We believe system development costs of about $800,000 will be required and add a total of $300,000 to the estimates in Reference 2 to represent the portion we do not believe is covered in the existing budgets.
- The best estimate we have been able to obtain for the acquisition of approximately 800,000 volumes of periodical back copies (through a mix of gifts and purchases) amounts to about $11 million. We deduct the $8.4 million allocated (in Reference 2) to this element during the first four years, leaving $2.6 million additional costs.*

---

*In Reference 2 it appears that a somewhat longer period for acquiring back copies was planned than we use here; if so, our figures would be more in agreement. However, we have treated the collection development budget item in year 5 as devoted to subscriptions payment

- We eliminate $1.350 million for communications costs from the budget because of the use of existing networks, as already described.
- We believe an additional $1.5 million should be added for contingencies.

The net effect of all these changes amounts to $4.05 million of additional costs. When added to the previous total, this suggests that $26.5 million are required for start-up and transition subsidies.

For purposes of comparison with private sector costs, the above would have to be increased by interest compounding at a rate of, say, 10% per year for four years. This would lead to a total "investment" of $34 million by year 5.

System C

For System C we use System B as the starting point, making adjustments as shown in Table IV-6. These include:

- For Capital Equipment and the half of the initial operations deficit* related to acquisitions activities, we reduce the costs by 1/4 to reflect the smaller collection size.
- For the half of the initial operations deficit represented by access-related activities, we reduce the costs by 2/3.
- Operating income is provided by 1/3 the demand used for System B, but we indicate a higher fee in keeping with the goal of setting the initial fee lower than, but close to, the expected eventual value.

(even though we treat back-copy development as largely acquired through gifts). The question of subscriptions payment during full-scale operations is an important one; gifts or publisher donations (which will require good publisher relations) could reduce NPC costs and we recognize that we have selected the "worst case."

*Table IV-5, from which the figure of 1/2 is derived, applies to an operating rather than a build-up environment; as a result, this procedure may understate the System C costs.

TABLE IV-6

SYSTEM C. START-UP AND TRANSITION COSTS
($ Millions)

Item	System B Cost	Adjustment Factor	System C Cost
Capital Equipment	6.75	by 3/5 (Collection Size Related)	5.06
Initial Operations	20.80	1/2 by 3/4 (Collection Size Related)	7.80
		1/2 by 1/3 (Demand Related)	3.46
Less Income	- 7.35	0.7 Million items at $4.50	- 3.15
Plus Copyright	2.22	0.7 Million items at $1.06	.74
SUB-TOTAL	22.4		13.9
Publisher Relations	1.25 (- 0.25)	by 3/4 (Collection Size Related) - (0.25)	0.69
Systems Development	0.80 (- 0.50)	To bring total to 1.50	1.00
Communications	- 1.35	Lower reduction by 0.10	- 1.25
Contingency	1.50	Reduce by 1/3	1.00
SUB-TOTAL	1.45		1.44
TOTAL	$26.5* millions		$15.3 millions

---

*Including $2.6 millions extra for back-copy collection costs considered in System B.

NOTE: Items in parentheses denote allowances, when making modifications, for parts of items already included in budgets.

- The Publisher Relations cost adjustment is set so as to keep this total cost element proportional to collection size.
- System development costs are increased to a total of $1.5 million, because of the greater complexity of System C described earlier.
- Communications costs are reduced somewhat less than for System B because of the new links to the private sector activities required; and the contingency fund category is reduced by 1/3.
- The adjustment in acquisitions costs for back copies made for System B is ignored, since the adjustment required there is just about balanced by the smaller collection size of System C.

After all adjustments are made, the Start-up and Transition subsidy requirements for System C amount to $15.3 million, or somewhat less than 2/3 those of System B. (If interest charges are added, the total is $19.5 million for System C, corresponding to the value of $34 million for System B.)

C. PARTICIPANT SECTOR COST AND REVENUE CHANGES

The general quantitative background given above provides most of the numerical values used in our analyses. We now can return to the subject of particular participant sector financial interests, adding a few other quantitative values as needed.

1. Publishers

The areas where changes might arise in publisher costs and revenues include:

- Copyright charges collected.
- Net subscription revenues.
- Net advertising revenues.
- Distribution costs for current issues and reprints and for back issues.

(a) Copyright Charges

All the data necessary to calculate copyright charges that publishers would receive has been provided in the prior section of this chapter. The information required, per item processed through one of the systems, involves only the fraction of items on which copyright charges will be collected and the level of these charges. These, as presented earlier, amount to:

- For System A - 15% x $2.40 = $0.36 average per item.
- For System B - 73% x $1.45 = $1.06 average per item processed through the dedicated center.
- For System C - 73% x $1.20 = $0.88 average per item for material processed through private sector firms, plus $1.06 for items passing through the dedicated center.

In viewing these figures, the bias among library categories in payment of copyright charges should be borne in mind. For all libraries other than special libraries, the costs under System A will be some $0.33 less per item than the values indicated above.

(b) Net Subscription and Advertising Revenues

These two items are considered simultaneously because they pose similar analytical problems. In broad terms, it is very difficult to establish whether and how many subscriptions (and how much advertising revenue) might be lost as a result of an improved ILL system; and it is likely, for at least the near-term, that the extent of such losses will not be noticed in the general change of library subscription patterns arising from the combination subscription prices and periodicals numbers increasing at a rate faster than library acquisition funding. Finally, the institution of a system whereby copyright charges can be collected in a broad and consistent fashion, and with levels set by publishers, could be used to recoup losses in subscription and advertising revenues.

In somewhat more detail:

- The largest cohesive NPC equivalent in the world, the British Lending Library Division, has been operated for some time and studies have been quoted as indicating that few, if any, subscriptions have been lost as a result of its operations. However, the applicability of this experience has been questioned on several bases; for example:
    - the prior periodicals holdings patterns of British libraries may have been sufficiently different that the British experience may not be applicable in the U.S.;
    - the pressures of significantly higher subscription prices may not have been at work long enough for libraries to change their acquisition habits, so the threat may still exist even if not detected clearly yet.
- Although ILL has grown rapidly in recent years, it is difficult to find evidence that this activity has had any significant impact on subscription patterns. References 5 and 6, for example, indicate little change in the break-even usage level at which it is better to borrow rather than subscribe to a periodical. Although subscription prices have risen sharply, both other library costs and customer usage levels also have increased; so recent changes in patterns seem more likely to have arisen from other sources of economic pressures than growth in ILL.
- Reductions in the future costs of ILL can, of course, shift the subscribe-borrow break-even point and clearly there are expectations of lowering ILL costs. Balancing this is the increasing tendency for lending libraries to charge fees, and this will move toward restoring the borrow-buy break-even as viewed by borrowing libraries.
- Since advertising revenues tend to depend on numbers of subscribers for a particular periodical, all the above remarks also apply to advertising (ignoring other factors which

> influence the competition between periodicals advertising and other media). While advertising is unimportant to many scholarly journals, it is extremely important to at least some of them, and to trade journals and other types of periodicals. It is of particular interest in that advertising revenues represent one of the very few outside sources of funding to the periodical-subscriber-library complex. However, the value of advertising is transient, so ILL systems that lower document retention but do not significantly influence subscriptions should have no impacts.

In the short term, there appears to be no reason why publishers cannot recover the costs of subscriptions lost because of ILL through increasing copyright charges. The requirement for these increases can be minimized if attention is paid to limiting or making expensive the access to recent issues (as proposed in Reference 2). The longer term threat posed by major increases in electronic publishing, and the possibility that an NPS might speed progress in that direction, are not relevant to our quantitative analysis but are discussed elsewhere.

In summary, the issue of subscription and advertising revenue loss is not explicitly modeled in our analysis on the assumption that, for the time scale covered by our work, increases in copyright charges (above those described earlier) can provide essentially equal compensation.

(c) Distribution Costs for Current Issues and Reprints

Other possible sources of cost changes that we regard as having little or no impact are those concerned with use of an NPS to handle requests (either physically or through order processing and transmission to publishers) for current individual issues and reprints. (The same remarks, we might note, apply equally to considerations of servicing back issues and other material currently handled by publishers.)

In general, there appear to be few economic incentives for an NPS to provide a service of this type. A large fraction of reprint and back issue orders come from individuals, rather than libraries, and these are unlikely to be much influenced by creation of an NPS. While there can be savings to publishers from receipt of orders in machine-readable form, these savings are not great. Relative to telephone orders, they can be as much as a dollar per transaction (based on other industry order entry experience) but for mail -- which most frequently is used -- the savings are unlikely to be more than $0.25 or so. The total income to an NPS would be small, and an effort to incorporate this diversion from its main thrust does not appear justified.

Looked at in another way:

- Many publishers will prefer to keep the handling of reprints and current and back orders in their own hands because of the contact it gives them with their marketplace.
- An NPS might find that efficient publishers, who can manage their systems more economically than the NPS, will retain their current and back issue ordering and reprint processing, while the inefficient ones will rely on the NPS -- quite possibly inflicting heavier costs on the system.

Since we do not believe an NPS should consider conduct of these types of operations in the time frame of interest, we ignore their influence on the costs of publishers.

2. Private Sector Document Distribution Organization

Our attention in this area has been focused on private for-profit firms, rather than not-for-profit organizations, because the former have been far more active and aggressive in the periodicals distribution operations of greatest concern to this analysis. In the process, we ignore a number of major opportunities in the not-for-profit sector, such as those which might be exploited by organizations such as Chemical Abstract Services, so the analysis is incomplete in this regard. Because some of the not-for-profit sector activities can charge off their materials acquisition costs to other purposes, as is the case for CAS,* the costs we derive here are higher than those that might apply to a "system" involving a combination of the two types of organizations.

The private for-profit sector is a mix of many operations, some of which offer highly specialized (and often expensive) search and delivery services and others of which concentrate on lower cost delivery of items which users have identified and requested. Once again, we will concentrate our attention to the organizations (or the parts thereof) that offer the services most corresponding to ILL.

(a) Demand

Much of the information needed for a good analysis of private sector opportunities is proprietary, but the general picture that emerges involves:

- Current delivery of documents approaching one million per year (according to IIA statements) corresponding to somewhat over 10% of current ILL demand.
- Growth at a rate of approximately 15% per year, which will lead to on the order of three million documents delivered in 1985 if this growth continues.
- Only limited overlap with most ILL activities:
    - UMI, for example, which is the dominant organization in the area of interest to us, has indicated that only 25% of their business is with academic libraries, 13% with public and government libraries and the remainder with business organizations, international and private individuals. For ISI, almost all of their activity is involved in servicing businesses.

---

*Some for-profit organizations, such as ISI, are in a similar position.

- For some organizations, such as ISI (with 140,000 items serviced per year) attention is focused only on periodicals less than three years old.
- Many of the items provided by the private sector would not be of interest to an NPC since they involve materials such as government reports, Ph.D. theses and the like.

Based upon the above figures, we estimate that only about 35% of the business currently done by private sector firms is likely to be vulnerable to any form of diversion by a System B-type NPC. Since the prices are not likely to be very different for the two types of services, and since the private sector companies may be better located in many cases to effect timely delivery, we believe that only half of this vulnerable portion, or about 18% of total private sector demand, might be diverted to a System B-type NPC.

(b) Prices

Current prices for document delivery also vary widely, from a low of $3.50 (for ISI) to much higher figures. Because of its dominance in the field, we will use the UMI figure of $6 as representative of the fee for the type of service of interest. To make figures comparable, however, we will deduct $0.70 from this fee as representing current copyright payments (which we are treating as a separate component throughout our work).

Future private sector document delivery prices, as they would be influenced by the existence of and competition within a System C environment, cannot be established with any surety. However, the following adjustments can be made to current fees for illustrative purposes:

- A $0.50 reduction representing the availability of automated inputs from an NPS, which will reduce order processing, record keeping, billing and other cost components.
- A $0.75 reduction to represent the net benefits of economies of scale, achieved through the greater demand funneled to the

private sector by an NPS, less the compliance costs for meeting NPS standards, payment of NPC service fees (above pass-through front-end communications costs) and similar matters.

The resulting price of $4.05 should be viewed as an average covering a wide range of situations. For very high demand items, a level of automation comparable to that planned for an NPC could lower costs significantly. Organizations like ISI can continue to set fees on the basis of charging materials acquisition against other purposes.

Overall private sector costs should be comparable to costs of a System B NPC if normal private (for-profit) sector "return on investment" were charged against an NPC. In fact, since in System C the private sector can be selective as to which items it chooses to serve, the cost for these items should be lower than those of a System B. We have made some rough calculations of subsidy cost impacts and the resulting figures agree with this premise.

We, therefore, use the price of $4.05 per item but consider this an upper limit average, which could be lowered by greater participation of not-for-profit private sector organizations well positioned to participate in the delivery activity.

3. System Costs -- Systems B and C (Collection-related Component)

Neglecting for the moment front-end communications and copyright costs, system costs are easily derived from material given earlier, and are displayed in Table IV-7.

We now can investigate one final modification to the figures for System C. Since the lower service cost, high volume segments of the collection have been passed to the private sector, and since the automated order entry, billing, etc., which a System C will make possible, can provide economies to that sector (as already noted), it is not inappropriate for a System C to charge a fee for these benefits to be used to subsidize lower use categories of demand. This fee probably cannot be large -- in fact, there are some questions as to

TABLE IV-7

BREAK-EVEN PRICES TO RECOVER SYSTEM OPERATING COSTS

I - System B

Collection Size = 50,000 Titles;
Acquisition Related Costs = $3.9 Million/Year

Demand	Acquisition Costs/Item	Access Cost/Item	Total
4.8 M Items	$0.81	$1.36	$2.17
2.0	$1.95	$1.36	$3.31

II - System C (NPC Component)

Collection Size = 37,500 Titles;
Acquisition Related Costs = $2.95 Million/Year

1.6 M Items	$1.83	$1.50	$3.33
0.67[*]	$4.38	$1.50	$5.88

---

[*] At this level of demand, the scale economies restriction applicable to our scaling rule may not be applicable; if so, the results are favorable to use of System C since, otherwise, the Access Cost/Item would be higher.

whether a System C provides sufficient "added value" relative to competitive mechanisms (such as direct links through bibliographic utilities, etc.) that libraries will seek high usage items through the System C access mechanism. For illustration, however, we will consider a fee of $0.25 charged on all transmissions switched to private sector suppliers.

If this fee proved competitively acceptable, the total figures in Part II of Table IV-7 would be reduced to: $2.83 and $5.38 respectively.

4. Libraries

The areas where changes might arise in library costs include:

- Copyright charges paid;
- Total lending and borrowing costs, using each of the three systems studied; and
- Reduced retention costs made possible by a reliable and more economical ILL system.

(a) Copyright Charges

Here the libraries face the exact inverse of the situation analyzed for publishers; what appears to publishers as increased revenues will be added costs for libraries. The figures from the previous section, therefore, are simply reversed.

(b) Lending and Borrowing Costs

Library lending and borrowing costs have two components:

Front End Costs

These, as previously described, amount to:

- For System A - $0.90 per item.
- For System B - $0.88 per item.
- For System C - $0.88 per item for orders entering the NPC dedicated collection, and $0.93 for orders transmitted to the private sector.

Direct Lending and Borrowing Costs

From material developed earlier in this chapter, these amount to:

- For borrowing libraries of all systems, costs of $4.27.
- For lending libraries, costs of $5.65 will be incurred under System A.
- For lending institution service fees:
  - $3.31 and $2.17 per item for System B, with the higher figure applying to 2 million requests per year and the lower figure to 4.8 million requests per year.
  - $4.05 per item for items directed to the private sector in System C.
  - $5.88 and $3.33 for items serviced through the dedicated center of System C, with the higher figure again applying to 2 million requests per year and the lower one to 4.8 million requests per year.

(c) Retention Costs

One possibility for lowered costs would be through changes in library practices such that periodicals material would not be retained for as long as at present. This could be viewed as possible if a thoroughly trusted ILL/NPS were available and if its costs were sufficiently low that it became more economical for libraries to borrow materials than to retain them.

This subject has been studied extensively (References 5 and 6) but with results presented primarily in terms of weeding titles on the basis of their individual usage. While this is sound policy, it poses a number of difficulties in making an aggregate analysis.

The possibilities for savings arise from:

- Storage related costs, which depend to a considerable extent on the availability of space but which we estimate at about $0.60 per year per volume.
- Avoidance of bindery costs, which involve (Reference 6) almost $14.00 ($5.10 for preparatory labor, with overhead, and $8.65 for binding).

For a periodical weeded after five years of use, approximately $25 could be saved during the next 20 years, or about $1.25 per year per volume. On the other hand, the $25 would correspond to the costs of making only two or three borrowings of material from this volume, with the higher number incorporating an extra cost allowance (on the retention side) to balance the extra search effort necessary to locate older material that is retained. Since the material will have accumulated over 75% of its total usage during the five years before weeding, the 2-3 borrowings of material from a particular volume over 20 years correspond to 8-12 total uses of that volume (during its life), or to 200-240 total uses of the title.

It is difficult to find a satisfactory way to relate these figures to other usage data available to us. However, since the subject is an important one, we again will provide a crude illustrative example. If the 110 libraries reported in ARL Statistics for 1978 were to leave unbound, and then weed out after five years, the one-third of their periodicals which receive lowest usage, then this process would permit savings of:

- Binding costs of 800,000 x $14.00 = 11.2 million (providing binding prior to weeding was avoided);
- Annual storage costs of $0.60 which would provide $0.48 million of savings the first year;
- Annual storage savings of $9.6 million eventually, as the years of weeding increase;
- The combined potential savings (ignoring borrowing costs that would result from the process) amounts to over 25% of the amount currently spent on periodicals subscriptions.

Extending this process to other categories of libraries would, of course, increase the potential savings, subject always to charges for later borrowings of this low use category of material. However, the entire process is dependent on changes in library practices and the development of more economical means to effect access to weeded periodicals. We will not make use of any specific value for "weeding" potential in this study but we do wish to note that the subject, although conceptually well treated in several references, appears to require a lot more attention if these results are to be applied in a practical way.

5. Social Costs

Initial subsidies for start-up and transition have been estimated as:

- System A - None;
- System B - $26.5 million (or $34 million if interest charges are included); and
- System C - $15.3 million (or $19.5 million with interest charges).

The matter of operating subsidies is uncertain and arbitrary. We have performed our analysis on the basis that the systems will operate in a break-even position after an initial subsidy, so any subsidy provided can be treated as simply reducing the break-even charges to users or as subsidizing expansion of activity into still lower usage categories of material.

Only one specific operating subsidy seems worth comment: it has been suggested that postage franking privileges might be made available to an NPS and the size of this subsidy can be estimated. We believe the price of first class mail will increase faster than the inflation rate to a level, in current dollars, of $0.20 by 1985. In rough terms, a postal subsidy would provide a reduction in all NPC costs of about $0.235 for all items processed through a dedicated center.

D. COST AND REVENUE SUMMARIES

Summaries of costs and revenues are provided in Tables IV-8 and IV-9.

Table IV-8 gives unit costs for all participants. The material used has all been presented earlier but two items merit comment:

- For System B, it is assumed that private sector firms lose 18% of their current business regardless of the level of demand on an NPC. For 4.8 million demand this may be reasonable, but for the lower level of 2 million it probably implies excessive effectiveness of the NPC in diverting business from private firms.
- For social costs, subsidies have been allocated over five years of demand at the specified rates (e.g., over 24 million and 10 million items for System B) to establish unit costs.* This is arbitrary but it provides an example of the impacts of the subsidy over a reasonable period of time. A longer allocation period could be unwise, given the dynamics of technology and society that may pose threats of obsolescence to an organization such as a System B or C type NPC. Note that, although the subsidy is amortized, no return on the subsidy as an investment is required during this period.

Interpretation of the total costs in Table IV-9 is largely a matter of value systems:

- System A is clearly the most expensive of the systems for libraries and System B is the cheapest. However:
  - individual libraries, depending on how they view their costs and how they obtain funding, may still find System A the most economical method to use;
  - when subsidies are taken into account, System B is less economical at low volumes but superior at high volumes.

---

*For System C they apply only to the volume going through the dedicated center, not to the total volume.

TABLE IV-8A

UNIT PARTICIPANT COSTS AND REVENUES
(4.8 Million Items/Year)

	System A	System B	System C	
			Dedicated Center	Private Sector
A. PUBLISHERS				
Copyright Revenues	$ 0.36	$ 1.06	$ 1.06	$ 0.88
TOTAL	$ 0.36	$ 1.06	$ 0.94	
B. PRIVATE SECTOR FIRMS				
Revenues Gained or (Lost)	-	(0.60)	-	4.05
TOTAL			$ 4.05	
C. LIBRARIES				
Copyright Payments	$ 0.36	1.06	1.06	0.88
Front-End Communications	0.90	.88	.88	0.93
Borrowing Costs	4.27	4.27	4.27	4.27
Lending Costs	5.65	-	-	-
Service Fees	-	2.17	3.33	4.05
SUB-TOTAL	-	-	$ 9.54	$10.13
TOTAL	$11.18	$ 8.38	$ 9.94	
D. SOCIAL COSTS				
Subsidies	-	$ 1.10	$ 1.91	-
Subsidies with Interest	-	$ 1.40	$ 2.44	-
Postage Subsidy	-	$ 0.23	$ 0.23	-

TABLE IV-3B

UNIT PARTICIPANT COSTS AND REVENUES
(2.0 Million Items/Year)

	System A	System B	System C	
			Dedicated Center	Private Sector
A. PUBLISHERS				
Copyright Revenues	$ 0.36	$ 1.06	$ 1.06	$ 0.88
TOTAL	$ 0.36	$ 1.06	$ 0.94	
B. PRIVATE SECTOR FIRMS				
Revenues Gained (or Lost)	-	(0.60)	-	4.05
TOTAL	-	(0.60)	$ 4.05	
C. LIBRARIES				
Copyright Payments	0.36	1.06	1.06	0.88
Front-End Communications	0.90	0.88	0.88	0.93
Borrowing Costs	4.27	4.27	4.27	4.27
Lending Costs	5.65	-	-	-
Service Fees	-	3.31	5.88	4.05
SUB-TOTAL	-	-	$12.09	$10.13
TOTAL	$11.18	$ 9.52	$10.79	
D. SOCIAL COSTS				
Subsidies	-	$ 2.65	$ 4.59	-
Subsidies with Interest	-	$ 3.36	$ 5.85	-
Postage Subsidy	-	$ 0.23	$ 0.23	-

TABLE IV-9A

TOTAL PARTICIPANT COSTS AND REVENUES
(4.8 Million Items/Year)

	System A	System B	System C
A. PUBLISHERS	$ 1.728	$ 5.088	$ 4.524
B. PRIVATE SECTOR FIRMS	--	(2.860)	12.96
C. LIBRARIES	(53.664)	(40.224)	(47.712)
D. SOCIAL COSTS			
Without Interest	--	(5.300)	(3.060)
With Interest	--	(6.800)	(3.900)

TABLE IV-9B

TOTAL PARTICIPANT COSTS AND REVENUES
(2.0 Million Items/Year)

	System A	System B	System C
A. PUBLISHERS	$ 0.720	$ 2.117	$ 1.880
B. PRIVATE SECTOR FIRMS	--	(2.860)	5.400
C. LIBRARIES	(22.360)	(19.040)	(21.580)
D. SOCIAL COSTS			
Without Interest	--	(5.300)	(3.060)
With Interest	--	(6.800)	(3.900)

- System C has the lowest total of costs (from Table IV-9) when all participants are considered, but this arises largely because the subsidies are used to create private sector revenues through the diversion of transactions to them via the subsidized network.

Thus, the quantitative data furnish important insights into the nature, sensitivities and structure of the costs and benefits of the systems but, by themselves, they cannot furnish any unambiguous statements of system superiority.

E. SUMMARY OF FINDINGS

The quantitative material presented in this chapter obviously possesses considerable "false precision" in view of the many assumptions necessary to derive the estimates. In spite of this, a number of findings can be derived which flow from the general levels of costs involved rather than the details.

1. The NPC as a Social Investment

- It is clear that, in the context of ILL costs prior to this year, a System B-or C-type NPC would have been a superb social investment. By permitting a cost reduction to libraries in the range of $8-$10 per loan, the entire subsidy required to establish an NPC would have been recovered in just a few years of full scale operations.
- The introduction of automated ILL has changed this situation.
  - The relative savings we estimate for a future NPC matched against an improved automated ILL system is more likely to be in the range of $1-$3 per loan. At this level, an NPC still can be a good social investment but recovery of subsidy through library savings will take much longer and this means there will be greater risks from failure to achieve adequate volumes and/or future technological obsolescence.

  - Further study of the question of how cost-effective future automated ILL could be made, starting with data that should be forthcoming soon from OCLC, appears to be highly desirable for future library planning.
- The vulnerability of an NPC, given efficient automated ILL systems, will in part be established by library attitudes and the cohesiveness of the library community:
  - It seems unlikely that libraries will make massive use of an NPC with its associated service charges as long as no fees are required by lending libraries for ILL.
  - We did not analyze the question of ILL fees imposed by lending libraries earlier in this chapter because, in terms of the structure of our analyses, these fees would involve only transfers of funds within the library community. If lending libraries charged full cost fees, then an NPC obviously would become more viable. If, however, automated ILL distributes the lending process more evenly, then the fee impacts (viewed as applicable to the net of borrowings over lendings by a library) will become much smaller.

    Using ARL Statistics for 1978, for example, the current ratio of loans to borrowings is approximately 3.15 and the ARL libraries are responsible for providing approximately 20% of all ILL loans made. If automated ILL systems are successful in spreading the lending operations among more libraries, so that this ratio is reduced to a value of two, then ARL libraries would only be loaning an excess of 480,000 items at a 4.8 million demand level. If they charged a $6 fee, the net effect of this would be to increase ILL costs to borrowing libraries by an average of $0.60. If the entire national collection of libraries was composed of a mix of net lender and borrower groups, with the former having characteristics similar to those of the ARL libraries, the fees (e.g., the net effect of both lending and borrowing) could rise to $3.00 on an average, still leaving automated ILL a good match for an NPC in the eyes of an individual library.

  - It appears that the economic factors impacting on choice between ILL and an NPC will be made on the basis of: how individual libraries view their cost structures; the degree to which they receive budgets that permit choice in means for acquisition of desired items, as opposed to forcing or limiting this type of decision; and the degree to which the library community remains cohesive and cooperative in servicing ILL, either free or for moderate fees.

- It must be emphasized that the above material is based entirely on our quantitative data and does not deal with timeliness considerations, service reliability, user willingness to pay pass-through fees for prompt delivery of material (and library willingness to charge such fees), preservation considerations, and many other library interests which are discussed in the next chapter.

2. NPC Environment

In developing our cost-benefit analysis, the following NPC environmental characteristics were noted.

- The NPC probably should seek to make use of the bibliographic utilities for management of its incoming communications, since the system (and the libraries, except for very large ones) cannot afford the extra costs of dedicated terminals and -- to a lesser extent -- redundant communications systems.
- The effectiveness of an NPC is quite volume dependent. This is not surprising since it is predicated on making a significant investment for materials and automated systems and it, therefore, faces problems typical of modern manufacturing operations. In general, it will not be particularly

economical below two million demand and only comes into a position of strength above four million.

- Reliance on market-driven development of services of private (for-profit and not-for-profit) sector suppliers would be cheaper than development of an NPC if a typical business "return on investment" were required from subsidy money used to establish the NPC. This arises because considerable collections and infrastructure already are in place in the private sector, and because equivalent efficiencies of scale can be expected of both types of organizations except for very high demand levels, where the NPC might achieve an advantage.
- A network-oriented NPC ultilizing a mix of private sector suppliers and a new residual dedicated collection (System C) appears to be the weakest alternative from a cost/financial viewpoint, since it involves heavy materials investment for the dedicated center collection which will end up serving very limited demand. Under these conditions, even though the subsidization of a "market-building" network can provide a socially useful system, the residual NPC collection becomes a very close approximation of the CRL -- and the latter probably should be established as the residual collection rather seeking to build a new one. Even with this, System C can face difficulties in competition with System A, and have a hard time proving itself superior in offering services the bibliographic networks could (and probably will) also offer.
- Close cooperation between an NPC and publishers is a necessity if the NPC is to work, regardless of whether it is model B or C. Our analyses in this chapter have been predicated on a high degree of publisher acceptance of relationships with NPC. Publisher ability to refuse participation in a System B could be quite crippling; and measures to force such participation, or to by-pass the need for cooperation through contractual relations with "supplier" libraries, or to seek

to limit copyright charges and similar actions inevitably would lead to a court case -- and one for which the plaintiff is apt to select carefully both the particular situation and the jurisdiction that will be most favorable to his interests.

3. NPC and Copyright

Copyright clearly raises many sensitive issues.

- Publishers have a natural interest in the establishment of a centralized system of some type that will permit increased collection of copyright charges.
- For the most part, the critical factor to publishers is not the level of copyright charges; to illustrate this:
  - 50,000 subscriptions to support a System B-type NPC (assuming such subscriptions were not donated by publishers) amount to approximately $2 million annual revenues to publishers; this, by itself, is almost half the annual revenues that publishers could receive from copyright charges (using the figures we have employed) for an NPC demand level of five million requests a year.
  - Using the eligibility figures we have employed, copyright charges for a System B-type NPC could be increased to the range of $4-$6 per item before NPC break-even costs exceeded equivalent costs for an ILL system (assuming that the unit copyright charge level for both systems were made equal as they were raised to the figure given above).
- Fundamentally, the key copyright issues for libraries appear to relate to a number of important uncertainties, including:
  - If libraries become dependent on an NPC (either System B or System C), they then could become very vulnerable to increases in publisher-established copyright charge rates and could have little or no ability to influence these decisions.

- The wide variation in copyright charges pose many awkward management and cross-subsidization problems to a System B-type NPC, whenever these charges are not related to the subscription price.
- Even more critical is the inadequacy of CONTU guidelines, which are subject to so many different interpretations that resolution appears highly unlikely within a time frame such that the full implications for an NPC can be established in advance, assuming the NPC project is to move forward at a noticeable rate.

- A number of common interests between libraries and publishers appear not to be fully recognized. For example, to the extent that libraries have essentially fixed budgets, it is in the interests of publishers that they use as much of these budgets as possible for materials acquisition. One means for increasing acquisitions budgets would be to employ an active process of "weeding" older materials, as discussed earlier herein. The lowest use one-third of all periodicals probably have extremely low usage after five years of age -- for the distribution shown in Table IV-4, for example, the total uses, per title in this category, would be about four per million requests. This level probably would be higher for those libraries that had good reasons for originally acquiring subscriptions, but the aggregation of 75% of total demand in the first five years of a periodical's life can balance this to at least some extent.

  Regardless of the exact figure -- and we believe it important that further studies be conducted on this subject -- the current position of publishers on copyright charges works against this practice. A library that seeks to rely on an NPS, so that it can conduct weeding operations for the sake of increased materials acquisition, would have to pay copyright charges on use of the material that it once had and weeded out. This works to the benefit of neither publishers nor libraries.

It must be emphasized again that the above findings relate purely to our quantitative material and that many other aspects, some having even greater long-term social importance, will be covered in the next chapter.

CHAPTER V

ANALYSIS OF QUALITATIVE ISSUES

A. SCENARIO ANALYSIS

If NCLIS is to recommend legislation leading to a National Periodical System along the lines of System options B or C as discussed above, implementation is not likely to be achieved for about 5 years, until 1985 at least. The decision facing NCLIS with regard to a direction for an NPS, therefore, needs to be based on expectations of what will be in the future, in 1985 and beyond, not on what has been in the past. We have, therefore, prepared a "scenario" projection of the environment for 1985, as part of our analysis effort that extends beyond modeling quantitative factors. We felt it very important to do this because the driving forces already in play are so significant that the conditions of the future will be very different from those of today, regardless of the NPS decision. Many of the circumstances of the past on which earlier NPC studies were based, for example dependency on the highly inefficient traditional manual system for ILL, are not in rapid transition. Our purpose here is to identify some of the more important developments to be expected and their implications.

The scenario analysis is necessarily brief and incomplete, given the limited scope of our effort; we feel, however, that it illuminates some very important dimensions of the NPS decision which heretofore have not been considered. We start out with the common scenario elements: what the situation might look like in 1985, more or less independently of which of the three basic approaches to the NPC being considered is taken. Then we consider subscenarios for each System approach that lay out the corresponding variations that can be expected from the base scenario. Following each subscenario, we list positive and negative implications of the System approach considered. These are among our findings. At the end of the chapter, we summarize how each System approach relates to evaluation criteria listed previously.

We need to stress that the scenarios are not predictions; we are not forecasting the future. It is highly unlikely that events will turn out exactly as described. The scenario approach is a useful way of pointing out the kinds of developments we think will be important, however. To lend a sense of concreteness, we have identified activities with particular existing organizations, such as OCLC. Such activities could in many cases be undertaken by other organizations now in existence or yet to come.

B. COMMON ELEMENTS FROM A FUTURES SCENARIO

1. Bibliographic Utilities

By 1985 almost all libraries in the U.S. of any importance will be connected on-line and making regular use of a bibliographic utility; some 7,000 libraries will have dedicated communications connections, with another 10,000 connecting through low cost ($150.00) TV-type terminals via dial-in to local number ports of national networks. Altogether there will be some 30,000 terminals in regular library use. There will be as many as eight to ten major utilities. OCLC probably will continue to be the biggest. Others probably will include RLG, WLN, and several that originate from the private sector including Gaylord, Bowker, Lockheed, SDC, BRS, and CL Systems. Although these utilities will have had their origins in more specialized areas such as circulation control (CL Systems and Gaylord), shared cataloging (OCLC) and publications ordering (Bowker), each will offer a full range of cataloging, bibliographic search, circulation control, publications ordering and interlibrary loan services, either through their own utility computers or through automatic switching to another utility that offers the service. By the late 1980's switching between service suppliers will be so automatic as to pose no inconvenience and will, in fact, be invisible to users (except for those who wish to use alternative suppliers), just as is the case today for the telephone system and for the electrical supply system. ILL requests will be switched automatically from the network of origin to another network when necessary.

2. Interlibrary Loan

The interlibrary loan situation for periodical articles will have evolved very significantly from what it was in 1979. These changes include:

- CONSER, on-line periodical check-in, circulation control, bindery and inventory control systems and ILL control software will have been refined to highly efficient forms, reducing the uncertainties of ILL operations for everyone.
- There will be significant lowering of ILL costs, particularly for borrowing libraries, coupled with much more timely and reliable overall service. A borrowing library will be able to determine, in at most a few hours or if necessary while a patron is waiting, which lending library will provide a photocopy of an article, when it will arrive and the cost.
- There will be a significant shift in the percentage of the overall lending library burden from the big research library institutions to the medium-sized and even smaller ones, partly as a result of conscious load-leveling policies.
- A decision will have been made by certain major research libraries to go into the ILL "business," involving charging for services, and gearing up internal inventory and clerical procedures so they can handle significant loads, and provide reliable service. Some will decide at the onset to pay copyright charges; others will be involved in litigation over copyright with publishers. These libraries will, in effect, be competing with the private sector document providers, and/or a centralized subsidized NPC using the ILL network apparatus.
- BLLD will have established satellite facsimile links with CRL and several other library centers in the U.S., and be available as a secondary source for rare items.
- ILL traffic in periodical articles will have continued to pick up since 1979, in part because of the higher effectiveness of

the on-line systems, in part because of a growth in subscription cancellations. As a service provided free or at a nominal charge by the lending library, it will be tending to level out at something like 20 million to 25 million transactions a year by 1985, however, because of a number of technological developments, changes in publisher and private sector delivery organization operations, and changes underway in library attitudes. We expect tendencies in the late 1980's for fewer libraries to be collecting materials they are willing to loan (copy) without a fee, and for private sector document delivery services (Systems A or C), and/or a subsidized centralized NPC (System B) to be siphoning off an increasing share of the ILL traffic.

The part of the ILL traffic that represents free service or only nominal charge by the lending library will stabilize as early as 1985-1990:

- Most libraries will be spending less and less for materials, relative to the amount published, and simply will not have as much coverage to photocopy from. The total amount of material available in a "loaning pool" of libraries which is defined by state library system organization or by a local cooperative agreement will be less.
- Many libraries will continue to suffer significantly from budget cuts combined with materials price rises, forcing them over and over to cut important services, with free ILL services to other libraries being among the first to go.
- In response, the big net lender libraries, those that will continue to be collection-oriented, will find it necessary to charge for their services, at least enough to cover direct ILL costs, and perhaps also to cover part of the costs of the collections themselves. This will be true even for the libraries that wish only to recover ILL costs, without making ILL into a "business."

104

3. Library Collections

By 1985 a process of library transformation already observable in the late 1970's will be much more visibly underway, namely a stratification of libraries into those that are mainly service-oriented, and those that are mainly holdings-oriented. The vast majority of libraries will be moving towards becoming the service-orientation type, increasingly buying and holding on to only materials that have an expectation of significant current use, and in many cases discarding or giving away back files. Acquisition budgets of these libraries will be used increasingly for high-use items, often in multiple copies, in some cases for single copies of medium-use items, and more rarely for purchase of low-use items. There will be more emphasis on providing service by using ILL, the private sector document suppliers and/or an NPC to obtain the materials not available in a library collection.

What has just been described is already true for school libraries, many special libraries and university undergraduate libraries; increasing numbers of college and public libraries also will move in the service direction. As this happens, we expect there will be a growing practice for a library to pass on costs associated with ILL borrowing of a particular item to the user of that item.

As mentioned previously, certain major libraries will continue to define themselves as collection-oriented. When faced by a worsening budget crunch and rising tides of ILL requests, they will decide to go into the for-fee ILL business as a means for survival and for preserving their identity through making their role explicitly one of providing comprehensive centers of stored knowledge.

4. Periodicals Publishing

Most periodicals will still be published in 1985 in the same paper-based form as today, but for several categories of periodicals very basic changes will be well underway. Here are some of them:

- Almost all important publications will be photocomposed out of computerized data bases, the exceptions being those from less-developed countries and the more esoteric domestic ones. Unlike the punched paper tape data bases of the past that were photocomposer-specific, the information will exist in true magnetic disk data bases from which it can be delivered in alternative forms with reasonable system software development effort. Data base management software systems, capable of handling massive amounts of textual information, will have reached a stage of maturity.

- Postage costs will have increased faster than inflation. This, together with continuing deterioration of service, will be enough to make the economics of paper-based information delivery less and less attractive.
- For many of the data base publications, a shift in usage from print-copy form to data base access form will have occurred in enough instances (including legal documents, government economic statistics, abstract journals) that major publishers will have decided that the handwriting is on the wall for most professional, scientific and technical journals, and they will be pursuing plans for unbundling of articles and/or for electronic delivery.
- The cyclical process of periodicals price increases and expansion in size and number, followed by library cancellations, followed by even larger price increases to cover the smaller subscription base, already observable in the 1970's, will accelerate throughout the 1980-1990 time frame. By the end of the decade many journal publications will have for all practical purposes ceased to exist except as demand publications, available in whole-copy or partial-copy form.
- Several new private utilities will have gone into the electronic demand-publishing business, providing delivery of single copies of periodicals articles at user sites instantly for a fee, and each servicing a variety of publishers. One of these might be modeled after the present

full-text LEXIS system for legal material, and offer users video-terminal browsing followed by hard-copy printout of articles or article segments desired. Another, perhaps created as a Xerox Company companion to Bowker and University Microfilms, might deliver full text of articles, including all graphics, through new generation "intelligent copiers." Current (1979) market developments with regard to satellite and packet communications systems developments, and with regard to development of copiers that also output computer data, suggest that low cost remote document delivery via an intelligent copier (that will cost little more than today's conventional copier) will be a reality some time in the mid-1980's.

We note that while we (Arthur D. Little, Inc.) have been pursuing the current study of a paper-based NPC or NPS for the United States, it is public knowledge that we simultaneously are pursuing a study for the Commission of the European Communities that is essentially a design study for an electronic NPS-type network. The study is of technologies, approaches and costs of document digitalization and teletransmission, oriented to serving the nine member countries of the European Communities.

We see the above scenario as consisting of expected events, largely independent of whether alternative NPS Systems A, B, or C are in fact realized. The specifics of how periodical articles are located and ordered and, to some extent, their availability, vary according to the system context, however, In the following subscenarios we suggest how they may vary.

C. SUBSCENARIO FOR SYSTEM A

We already have discussed the expanded and enhanced role ILL will play in any of the future circumstances. ILL will play somewhat of a larger role in the case of System A, i.e., the non-intervention approach, than in the case of the others. We go on here to discuss the likely activities of the market-oriented suppliers, both for-profit and not-for-profit. In this case, the market-oriented operators can be expected to respond to:

- The library demand for back copies that cannot be met in a sufficiently timely or otherwise satisfactory manner through ILL.
- Demand for periodical articles that flows around libraries, either directly from users or through private sector search firms, for example.
- Opportunities for business and profits associated with the new electronic utilities penetration into libraries; and
- Opportunities associated with electronic information delivery systems that connect directly to users, such as professionally-oriented systems (e.g., LEXIS) or home-oriented systems (e.g., View-Data).

Marketplace response to the challenge can be expected to come not only from for-profit companies, but also from not-for-profit organizations that use the marketplace to provide their service, like OCLC and Chemical Abstracts Service (which has a vast back collection of periodicals it has abstracted over many years).

A large variety of activities relevant to delivery of back copies of periodicals materials on a fee basis will be going on. Each of the on-line bibliographic utilities, for example, will offer its own order-fulfillment services for microform or hard-copy back copies, gathering requests electronically and sending them on to one or more commercial document delivery services such as those of Bell and Howell, University Microfilms, ISI. (SDC utility has such a service, 1979). These services will offer significant convenience for ordering of more frequently-used materials at prices (Chapter IV) comparable to or only slightly higher than those that would be charged by a centralized System B-type of NPC.

One or more commercial firms are apt to make businesses out of back-copy order fulfillment on a significant scale, investing in the necessary software, hardware, electronic data bases and finding tools as appropriate. A logical competitor would be the Xerox Corporation, which could combine the documentary resources of its University Microfilms subsidiary, the finding tool resources of the Ulrich periodical titles data base in its Bowker subsidiary, and the technological resources of its new xerographic "intelligent copiers" for electronic remote document delivery. Bowker will have augmented Ulrich with a listing of back-copy ordering sources, and will have as its data base a cumulative historical sequence, going back to its first dates of automation in the late 1970's. Bowker can be expected to put the data base on-line in its own bibliographic utility, and perhaps make it available to other utilities as well. Besides Ulrich there will be several other back-copy catalogs and finding tools available through private sector sources.

We estimate private sector back-copy document delivery to represent about 10% of the volume of the ILL load currently, and to be growing at about 15% per year. Its growth rate could accelerate in the early 1980's, if a firm decision is made not to create a subsidized NPC (assuming System A). This would remove the threat of direct government competition that has been hanging over these private sector firms for some four years and give them the confidence to make significant investments.

Somewhere in the decade between 1985 and 1995 direct electronic delivery of some categories of historical materials from suppliers will further negatively impact ILL as we know it today. As publishers move forward in electronic delivery, not only current material but also back material will in time be available through electronic delivery, without a need for retrospective conversion. A journal that cuts over to electronic delivery for current material as an optional alternative in 1983 will have ten years of its backfiles available for electronic delivery in 1993. The incremental cost of keeping and delivering that back material on demand electronically is relatively small but this will effectively remove such materials from the main ILL flow.

Unless there is a radical restructuring of publisher-library relationships, libraries themselves will not be able to participate in electronic information delivery, except through rather awkward fax transmission from paper-copy originals, an approach not likely to be cost-effective in competition with the newer technology. Thus, all-electronic ILL is not likely to develop. In the very long run, then, as electronic communications more and more replace the present paper-based ones, ILL must drop off unless publishers are willing to sanction libraries to perform a secondary electronic distribution function.

From the viewpoint of providing access to the periodical literature, the 1985-1990 situation is significantly better than the present (1979) in several ways:

- The interlibrary loan system is very significantly improved, with load more equitably balanced between lending and borrowing libraries, and faster, more reliable and lower cost service.
- There will be a rich variety of private and not-for-profit for-fee document delivery services (including libraries that decide to make a business of ILL) and alternative sources (like BLLD) accessible through electronic networks that could satisfy a high proportion of back document requests in a timely, reliable fashion with reasonable cost, if a library wants to use them.
- There are significantly improved finding tools for accessing back periodical articles, including a more developed CONSER and union periodicals lists for ILL, greatly improved ILL network software, and powerful tools for accessing publisher

and delivery service sources, such as an augmented Ulrich.

- For users, electronic browsing via terminals and, perhaps color microforms and/or video disks and cassettes, will be replacing shelf-oriented browsing.
- There is considerable innovation going on with respect to electronic delivery of both current and historical documents, many different activities, excitement.

On the negative side, as compared not with the present but with what might be sought from system approaches B or C, we have:

- The preservation of some older and little used materials may be in jeopardy, as libraries move away from collecting and may even purge old collections, since there is no single agency specifically charged with collection and preservation.
- There may or may not be significant numbers of back-copy order requests that simply cannot be satisfied out of files of the for-fee providers.
- Library access costs probably will be higher for ordering some (mainly low use) materials than they would be for the other two options.
- Since there are many more options and choices, ordering a back document would require more selection and more time than it would in a system in which a single ordering source was guaranteed to be comprehensive.
- Perhaps most significantly, librarians may not wish to use the market-oriented document suppliers, because budget artifacts make the ILL appear to be free and inhibit paying service fees, and because both ethical and in many cases legal limitations are in the way of passing service charges incurred by the library on to users.

D. SUBSCENARIO FOR SYSTEM B

Each of the bibliographic utilities provides a switch into the finding tools and ordering system of the centralized NPC. There still are market-oriented document suppliers operating through the utilities, but their activity is considerably muted compared to that in the previous scenario. For example, Xerox has decided to hold back on the retrospective access components of their new electronic document delivery service, leaving that to NPC. They decide to provide material current only as of the date of startup of their system, but not to convert any back files. Thus they define their main thrust in document delivery by the new technology used. Total subsidy of the NPC to date (1985) has been some $26 million in 1979 dollars, plus the equivalent of some $7 million in interest.

Traffic has built up to some 3.3 million requests per year. This is somewhat less than anticipated in earlier studies (4.8 million), primarily because many of the most significant document suppliers decided NOT to consummate license arrangements with NPC. What was originally intended to be a "solid" comprehensive collection has turned out to be somewhat of a Swiss cheese, because several of the key publishers decided to stay out of NPC for one reason or the other, in some cases in order to honor previously negotiated exclusive document delivery contracts with microform service deliverers. Thus, in effect, NPC has become another, though a very important, non-comprehensive document fulfillment service.

A debate is raging in 1985 among library and publisher circles as to whether Congress should be asked to provide major subsidy funding (perhaps an additional $75 million) to convert the more active part of the NPC data base into electronic form to enable economical electronic delivery from NPC using current technology. On the one hand, librarians are pointing out that the paper-based delivery system will be increasingly less economic to maintain and in the longer run become obsolete because of anticipated publisher electronic delivery activities. They argue that the public interest can be served best through the conversion. The private sector, on the other hand, argues the need can be met best through the free market, taking the position that "We told you it would be obsolescent before it got started; now that $30 million is poured down the rathole, you want to pour in another $75 million." The debate is very reminiscent of the debates in the late 1970's about whether the U.S. Postal Service should go to electronic mail. While the debate rages, NPC primarily delivers materials in photocopy via the mails, doing a limited amount of fax transmission. To all parties it is clear that the NPC has a very limited future as long as it remains a paper or microform-based organization.

On the positive side, as compared with the System A,

- Library access costs for ordered materials are somewhat lower; see the Chapter IV Discussion.
- Librarians have a single uniform and convenient interface from which to order documents, with assurance of service levels.
- Librarians in most institutions have been quick to respond to the existence of an NPC and have moved faster from a collection-orientation towards a service-orientation than they otherwise might have done.
- There is a comprehensive program of materials preservation as part of an NPC. Many feel this program alone is worth the investment in it, given an environment in which so many libraries are moving towards elimination of back materials.
- Some requests, for materials not covered by the private sector in System A, are filled that otherwise would require more extensive searching and conceivably, might not be filled.

On the negative side, as compared with System A, we have:

- NPC is vulnerable to not achieving its original objective, creation of a dedicated collection (or a small network of such collections) that is comprehensive in its historical coverage of the most-frequently used 50,000 periodicals.

Publishers can choose to stay out of an NPC leaving the collection a Swiss cheese instead of a solid block. (Reliance on a referral network for items in the collection is not too different from the automated ILL environment of System A, if the practice covers a large share of total demand.)

- If the volume of requests serviced by the dedicated NPC collection is less than originally projected, the actual cost of the system can be higher than that for System A; see the Chapter IV discussion.
- Investment and innovation flowing from the private sector for approaches to retrieval of back periodical articles is likely to be significantly less because of the likelihood of cancellation or delays in the development of new finding tools and innovative search software that might otherwise have been created to meet market need.
- The world of electronic information delivery threatens to pass an NPC by, requiring major new commitments which are extremely threatening to the private sector if an NPC is to remain viable.
- There is a danger of NPC becoming a unique "information monopoly" able to set arbitrary prices and conditions of use on its materials.
- NPC is constituted as a subsidized quasi-government organization, and therefore may be subject to bureaucratic stagnation.
- If the goal of materials preservation of an NPC is achieved and, as a result, libraries destroy back copies of materials, or cease collecting them, a serious problem of intellectual freedom could threaten. The situation could become one in which a single, centralized, bureaucratic government-sponsored organization increasingly controlled the unique copies of important knowledge resources and historical materials.

E. SUBSCENARIO FOR SYSTEM C

Impact on ILL in this scenario is very much like that in System B. The impact on private sector activities, however, is neither like that for System A or for System B. On the one hand, the creation of a new subsidized order-fulfillment NPC utility for back copies of periodical articles could exercise a chilling effect on the creation of order-fulfillment facilities for those materials by either the bibliographic utilities or the private sector organizations. Thereafter if the order-fulfillment and switching facility created by the NPS is successful, existing utilities will tend to switch their requests for back periodicals articles to the NPS utility. On the other hand, the market-oriented document suppliers can be expected to gain from the additional traffic generated by that utility. In our modeling exercise of Chapter IV, we investigated a situation where up to 3.6 million requests for article back copies were switched to the private sector in 1985, basically because of the existence of subsidized access tools and switched order-fulfillment activities.

In 1985, numerous policy issues continue to arise in connection with System C philosophy and operations, including the conditions under which private suppliers wish to take over titles in the dedicated back-up collection, and conditions which apply when private suppliers wish to divest themselves of a title. The goal, of having the dedicated collection contain only titles not provided by the private sector, but with adequate service guarantees, continues to prove very difficult if not impossible to enforce. On the one hand, those supporting the NPC claim that it is untenable to maintain a collection that cannot have integrity according to subject organization, and they argue that the subsidized NPC backup collection should be expanded to cover systematic bodies of knowledge. Private market suppliers, on the other hand, are unhappy with the regulations imposed on them and the ever-present threat of expansion of the subsidized NPC back-up collection. All parties agree that the NPC back-up collection is a very expensive and little used resource. They also agree that this resource is suffering the same pains of obsolescence due to electronic demand publishing as in the Subscenario for System B.

On the positive side, as compared with System A, System C has most of the features librarians were seeking in System B. From the private sector viewpoint, it has most if not all of the advantages of System A, and some advantages System A lacks. Thus, it appears to offer a suitable political compromise between the stakeholder interests of both groups.

On the negative side, it can be argued that System C does little but spend a lot of federal money that could be spent better elsewhere, and that it muddies the water with complex bureaucratic regulations and procedures. Its cost is significantly higher than that of the other alternatives. It can be claimed that it does little that would not happen anyway in System A, except physical preservation of materials, and its complexity slows down market-oriented responses to the basic problems involved. From the viewpoint of librarians, there are still a lot of different ordering sources involved, and complex choices still to be made when searching for and ordering a periodical article.

ANALYSIS BY CRITERIA

We summarize here the differences between Systems A, B and C, according to the more qualitative criteria elements of Chapter III.

F. SERVICE-ORIENTED ELEMENTS

1. Simplicity of Access and Use

System B is the simplest, followed by C and then A. System A offers the greatest variety of options to meet specific needs and the most potential for innovation; the trade-off is that the richness of options under A could continue to be unfamiliar and hard for librarians to use. There are hundreds of different ways of getting article copies today. There will be simpler on-line procedures in the future, but multiple options will continue under A. There will be multiple options under B and C, also, particularly if publishers decide not to cooperate with the NPC. Electronic delivery services will in all probability remain largely outside of a System B-type NPC. In the long run, the free-market approach of System A could lead to a comprehensive and simple system, as has happened for delivery of telephone and electrical services in the U.S., but not by 1985. For all three Systems, simplicity and access of ILL use will be far improved over that of traditional ILL methods, resulting in a far improved situation for both libraries and patrons.

2. Breadth of Coverage

On the face of it, System B offers the best approach, followed by C and then A. It can be argued, however, that enough breadth to cover any and all practical needs exists in A, particularly given electronic fax links in the future to BLLD and our own backup collections such as CRL to cover any residual demand the automated ILL and private market systems cannot readily handle.

3. Assurance of Availability

As for breadth of coverage, on the face of it System B is best followed by C and then A. However, as in the case of breadth, the practical assurance of availability in any system will be far greater than now. Traditionally, ILL could work only for a small pool of cooperating libraries or for a hierarchically-organized state or college consortium. Today, the OCLC network enables a library to borrow from over a thousand other libraries. The next few years will see adjustment as traditional ILL arrangements change to accommodate the broader base and greater speed of automated ILL. In five to ten years, the ILL software and union catalog(s) of periodicals' holdings in OCLC (and, as well for the other bibliographic utilities), will be so comprehensive that local sharing will be more effective and virtually all the nation's library resources will be available for ILL.

4. Order and Availability Confirmation

Systems B and C should be equally good, with System A reliable, but not quite as timely in its response. Again, the situation will be far better than in the past manual ILL environment.

5. Timely Delivery

Comments above also apply. The timeliness of System A, even in an automated ILL network environment, is likely to be significantly slower than that provided by an organization dedicated to order fulfillment. In the longer run, System A could provide more timely delivery to the extent that this system encourages free-market development of electronic document delivery systems. System C could have the same impact, while System B, as discussed elsewhere, is not well adapted to conversion to electronic document delivery. The same holds for the back-up document collection of System C.

6. Reliability in Meeting Standards

This is greatest in System B followed closely by C, followed by A. There can be disagreement as to whether there should be standards in the first place, however, and if so, as to what they should be. The argument against standards is that they will discourage innovation and lead to monolithic systems that become obsolete, especially given a new emerging electronic information environment. Rather different sets of standards are represented in the existing CONSER data base and the private-sector Ulrich data base. It is unclear whether these can be reconciled best under Systems A, B or C. As far as service standards, there is no question that these can be made explicit and enforced only under Systems B and C. Yet as has been the case for other areas of regulation, it can be argued that competition in the free market provides higher levels of service than a more monopolistic environment.

7. Assurance of Future Materials Availability (Preservation)

In principle, this should be equally good in Systems B and C, and uncertain in A. Threats to preservation could arise due to libraries moving away from a collection ethic, something likely to arise regardless of System. Some preservation-oriented library activity, perhaps utilizing resources like CRL and USBE, is probably justifiable under any situation. A preservation-oriented collection is likely best to be handled differently than one organized to fulfill heavy volumes of requests, such as in an NPC. Thus, it is unclear whether it is in the best interest of preservation to combine a national preservations system with a document delivery system.

8. Provision of Standardized Supporting Formats and Documentation (To Permit Increased Automation of Procedures by All Active Participants)

The comments above applying to standards apply equally here. Also, standards do not require the creation of a subsidized entity of any type; they can be created by a voluntary publisher-document delivery service-librarian group convened for that purpose.

In summary, with regard to these elements, System B appears to address them most directly. With regard to service levels, however, all systems will show improvement over the present situation.

G. IMPACT-RELATED ELEMENTS

1. Congruence of System with Future Technological Developments

System B is the most prone to technological obsolescence, due to the difficulty of changing its original non-electronic basic character. System A is somewhat more congruent with technological innovation, followed fairly closely by System C. In the long run, technology will favor a great deal of direct electronic information delivery from author to reader via electronic networks, most likely operated by information delivery companies. The roles of libraries and of publishers in such a transmission chain are presently unclear. From the publishing community viewpoint, there is a threat that in the future NPC could disintermediate them by directly publishing articles from authors in electronic form. From the library perspective, the creation of a meaningful role under these future circumstances is an important concern and deserves attention in its own right. It is not within the scope of our present study to analyze the public policy consequences of such developments, other than to comment that they are significant and should be studied before enactment of legislation that could have unforeseen consequences.

2. Congruence with Economic and Social Trends

Again, dealing with these factors in detail is beyond the technical-economic scope of our present effort. In our scenario discussion above we mention only some of these factors. We do not believe that the long-term consequences of a centralized NPC, or even of System C, have been brought fully into the light and studied. There are paradoxes to be looked at: if a System B-type NPC fails, it is a waste of public resources; and if it succeeds, it could constitute a dangerous information monopoly that could not only control prices for access but could in the worst of circumstances come under bureaucratic or eventually even personal domination, threatening intellectual freedom. Both Systems A and C seem relatively free of these problems. It appears to us that maintaining a high degree of redundancy in civilization's memory base is of very great importance if we wish to preserve and further our democracy. These matters deserve further examination.

We may or may not be correct in our scenario projections; but, in any event, we believe Systems A and C need to be projected more carefully into the future in order to analyze the complex possible interactions of publishers, private document delivery services, bibliographic utilities, electronic information delivery companies and libraries. An important result of the NPC experience is that libraries have participated in dynamic planning with the other stakeholders, helping to create what must be a mutual future. We have only scratched the surface of this dynamic here.

3. Implied Future for Library Information Delivery Systems

We are completely sympathetic with the intention of those supporting the NPC concepts, to assist libraries in moving into the present and future by shedding some of the burden of exhaustive collection development, and by lowering the costs and improving the effectiveness of ILL and thus serving patrons better. All three Systems will tend to have this impact, however, and our sense is that the differential impact of System B will be significantly less in the future than it would have been in the past.

4. Implied Future for Publishers and Other Industry Participants

System B creates direct government competition for the private document delivery suppliers, putting them out of business or creating a need for them to reorient themselves to specialized roles -- that is, if publishers cooperate with NPC. On the other hand, it represents an important "victory" for publishers, i.e., a mechanism that will pay copyright payments. The present CONTU guidelines for copyright payment for ILL are vague in important respects, almost impossible to enforce and likely to be evaded. The copyright issue is not monetarily important in the short run, however. Foreseen ILL payments together with NPC payments for copyright together do not amount to very much money -- a few million a year in 1985 (Chapter IV). Publishing is a multibillion dollar industry, and library activities also are measured in the billions. What is important, then, is not the direct dollars at stake; it is a matter of principles and longer term, poorly discerned threats of vulnerability. In our opinion, these have not been examined sufficiently as of yet.

NCLIS REFERENCE MATERIAL

Reference Number

1 National Commission on Libraries and Information Science, Task Force on a National Periodicals System, Effective Access to the Periodical Literature: A National Program, April 1977.

2 Council on Library Resources, Inc., A National Periodicals Center Technical Development Plan, 1978.

3 "Draft Legislation Proposal," Revised July 2, 1979.

4 Association of Research Libraries, A Study of the Characteristics, Costs and Magnitude of Interlibrary Loans in Academic Libraries, Westat Research, Inc., 1978.

5 Williams, Gordon, et al., Library Cost Models: Owning Versus Borrowing Serial Publications, National Science Foundation, Office of Science Information, November 1968.

6 Palmour, Vernon E., Marcia C. Bellassai, and Robert V. Wiederkehr, Costs of Owning, Borrowing, and Disposing of Periodical Publications, Center for Naval Analysis, Public Research Institute, October 1977.

7 Wood, James L., A Review of the Availability of Primary Scientific and Technical Documents within the U.S. (Final Report), Vol. II, U.S. Office of Education, Bureau of Research, October 1969.

8 National Commission on Libraries and Information Science, Library Photocopying in the United States, prepared by King Research, Inc., October 1977.

9 Waite, David P., "A Summary of the Copyright Clearance Center's First Year Operating Experience," June 14, 1979.

10 Statistical Indicators of Scientific and Technical Communications; 1960-1980, prepared by King Research, Inc., National Science Foundation, Division of Science Information, May 1976.

☆ U.S. GOVERNMENT PRINTING OFFICE : 1979 O—303-136